MECHANICS · AUTOS · HOMEBUILDING

POPULAR SCIENCE

March 35¢ MONTHLY

20-Page Family Boat Show

PAGES 154 TO 173

GM's New All-Purpose Truck Chassis

PAGE 140

End Filter Replacement FOREVER!

TRY THIS TEST

This simple "*bronze that breathes*" smoke test demonstrates the amazing porosity of a MICRO BRONZE oil filter. Metallurgists call bronze "the timeless metal." Thanks to war-time and post-war scientific development, MICRO BRONZE engineers now use sintered bronze to prevent undue engine wear and eliminate frequent oil changes.

with Revolutionary New Type

Micro BRONZE

Permanent All-Metal Oil Filter

ORIGINALLY DEVELOPED FOR THE U.S. GOVERNMENT for use in supersonic aircraft and guided missiles, MICRO BRONZE-type filters are the only filters made that provide *full* lubrication protection for modern automobiles!

ONLY FILTER THAT DESTROYS ENGINE ACIDS

GUARANTEED FOR 99 YEARS

FILTERS THE DIRT BUT NOT THE DETERGENTS

U.S. Patent App. No. 464496

Only Filter in the World with Built-in Acid Neutralizer!

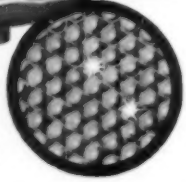
Special Acid Neutralizer Element in the Micro Bronze Filter →

THE SECRET IS THE "BRONZE THAT BREATHES"

Here at last is an oil filter that never needs replacing . . . increases your engine power . . . ends frequent oil changes . . . adds thousands of miles to engine life . . . stops waste of valuable oil additives . . . and saves you worthwhile money in the bargain! Tests give conclusive proof that Micro Bronze type filters are the finest, most economical oil filtering units ever made.

MAGNIFIED PORTION

of MICRO BRONZE filter showing microscopic metal balls fused together to make a solid, but porous, filter. MICRO BRONZE metal can't absorb additives, can't "channel," can't "blow," yet screens out finest particles of grit and metal which drop to bottom of filter housing as "sludge."



"FILTERS THE DIRT—BUT NOT THE DETERGENT!"

Major oil companies have developed heavy duty oils containing expensive additives and detergents that greatly reduce engine wear. Old-fashioned cloth, paper or earthen filters—standard equipment on many cars!—soak up these beneficial elements, but by-pass damaging abrasives and metal particles into the engine. The MICRO BRONZE exclusive double-cone design *filters out* abrasives and metal particles as microscopic as 39/millionths of an inch (one micron). Oil additives are *left in* to provide a protective film between moving parts. New MICRO BRONZE Oil Filters, combined with modern HD oils, *double your engine's life!*

Burned gasoline creates a strong sulphuric acid solution that eats into vital engine parts, causing them to wear out years before their time. MICRO BRONZE *is the only filter in the world with a built-in acid neutralizer* which adds years to engine life and eliminates the main reason for frequent oil changing.

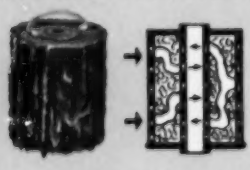
FITS EVERY CAR AND TRUCK

A MICRO BRONZE Unit that fits any standard filter housing including all full-flow models costs only $6.95. Easy to install, never needs changing. MICRO BRONZE Filter Housing, $9.95.

You'll save the total cost of your MICRO BRONZE Oil Filter in a few weeks. You save in replacement pack costs and "the quart for the pot" you need every time you change filter packs. *Most important, you save costly oil changes—with average driving, one oil change per year is sufficient.*

SOLD UNDER MONEY-BACK GUARANTEE TO LAST FOREVER!

THROW AWAY YOUR OLD FILTER



At left is shown an old-style filter "pack"—the kind that's probably in your car now. How can a dirty pack keep oil clean? It can't—actually contaminates your oil! Illustration at right shows how ordinary packs "channel" as a result of oil pressure, allowing dirt to tunnel through the pack and into the oil.

THIS MAY BE WORTH $10,000 OR MORE TO YOU!

If you would like to be one of the people we are appointing as a MICRO BRONZE Distributor or Dealer, write, wire or phone us today. Exclusive territories with profit potentials of thousands of dollars are now being awarded. Address: Sales Division, MICRO BRONZE Filter Corp., 11766 W. Pico Blvd., Los Angeles 64, California

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MICRO BRONZE Filter Corporation, Dept. PS-3
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Ship me immediately . . . . . MICRO BRONZE Oil Filters with lifetime guarantee as follows. I understand you will promptly refund my money if I'm not pleased.

☐ Conversion unit @ $6.95. Factory pays shipping.

☐ MICRO BRONZE Housing Unit (needed where car does not now have filter), $9.95 (does not include filter element). Factory pays shipping.

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ADDRESS _____

CITY _____ ZONE _____ STATE _____

MAKE, MODEL & YEAR OF CAR _____

Learn how homeowners everywhere save money by installing their own

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POPULAR SCIENCE
REG. U. S. PAT. OFF. *Monthly*

Mechanics and Handicraft
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March, 1955 ***Page***

How They Halted Delinquency on Wheels.. 99
Navy Runs World's Fastest Railroad.....105
Seagoing Car Park to Ship Tanks Fast.....110
So You're Thinking of a Station Wagon?....112
These Farm Inventors Made a City Boom....120
Cars You Can't Touch.....126
Don't Burn Out Your Shoulder Bearings....129
TV Professor Makes His Own Props.....133
How Some Painters Rook Homeowners.....135
GM Forecasts New Trend in Trucks.....140
There's Cash in Falling Stardust.....145
Whadda Ya Mean, Hot Rod?.....150

1955 Family Boat Show

The big news is the boom in "back-yard boating".....154
And this is called a "camper" boat.....158
Will there be a horsepower race? 160
Here come the "sports-car" boats.....162
Meet the seagoing house trailer.....164
Double garage makes it easy to park a boat.....166
Today's trailers make launching a cinch 168

Gus Pulls a Switch.....174
Building the New Marble-Top Furniture.....177
Eight Handsaw Tips.....186
Sixteen Ways to Use Your Drill Press.....188
Installing a Car Radio Yourself.....201
Watching TV from a Camel Saddle.....206
Spring Painting Tips.....208
New Uses for Machine-Woven Cane.....209
Transistor Hookups That Sing and See.....215
What You Can Do with Copper Tubing.....221
How to Patch a Screen.....232
How to Build a Saw Stand.....243

(More features and departments are listed on page 4)

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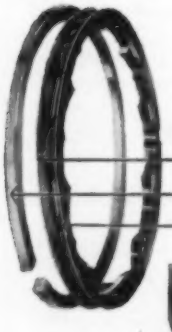

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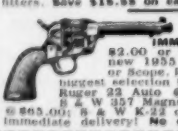

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News and Pictures

Colorful Planes Patrol Arctic....103
Biggest Cowpoke in the West....109
Army Green—Uncle Sam's Newest Color 109
You Need a Key to Work This TV....110
New Tester Beats Up the Road....110
Bike Rims Make Wall Framing....111
Noise Patrol Nabs Loud Bike....111
Clock Sets Traffic Rules....118
Once Upon a Time in Mexico....118
Great Steel Face Will Gulp Steam....119
Lincoln's Double-Bubble Dream Car....128
Chrysler Regains Horsepower Title....128
Crash Won't Puncture Plane Fuel Tank..134
Jets Zoom Seaplane to 600 M.P.H....134
Camera Snaps Speeder's License Plate..138
Car on Catwalk Helps Patrol Tunnel....138
Atomic Piles Go on Market....139
Huge Cave Is Frozen-Food Warehouse..139
Light Amplifier May Put TV on Wall....144
Giant Gauge Helps Workers Tailor Cars 149
Park Is Elevated to Park 900 Cars....149
New Gadgets Lure Small-Boat Sailors....170

Mechanics and Homebuilding

Wall-Switch Plate Frames Photo....185
Camp Stove Frees Car Lock....185
Modelmaker's Thousandth Project....185
Ship's Bell Decorates Gate....194
Wax Holds Screw in Position....194
Brush Sweeps Records Clean....197
Powder Puffs Quiet Typewriter....197
An Easy Way to Make "Bricks"....197
Camera Tripod Steadies Binoculars....200
Boards Aim Headlight Beam....200
Almanac for Motorists....205
Valve for Fido's Drinking Fountain....220
Condenser Stops Phonograph Noise....220
Sawing Wood with Paper....229
Picnic Plate Catches Paint....229
Decorative Items for Coffee Table....230
New Workshop Hangs on Door....236
Divider Holds Knickknacks....238
Vise Used Anywhere with Pad....238

Departments

Letters 14
Last-Minute News and Notes.... 96
I'd Like to See Them Make....104
New Aids to Living....152
New Ideas from the Inventors....172
New for Your Car....193
New Tools....195
Wordless Workshop 198
New for the Handy Man....214
Keeping the Home Shipshape....227
New Shop Ideas....240
Hints from the Model Garage....250

I saw my job failure in my family's eyes

. . . but how they smiled when I. C. S. pulled me through

Take it from me. That's the hard way to discover a mistake.

I thought I was in solid down at the plant with my years of experience. They'd never lay *me* off.

But they did. And I *was* in solid —as long as business was good. But when things started getting tight . . .

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I was sore, sure. But when I calmed down I realized he was right. I decided then to start learning. I signed up for an I. C. S. Course, studied at home in my spare time.

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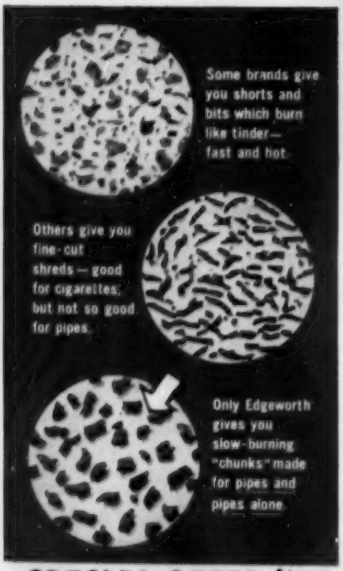

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PS-3

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Save 50% film costs. Because Vistascope adds 50% sweep to each picture, you save 50% of your film costs by telling the whole story with less "panning" or jiggling, and in fewer shots. So, each time you take Vistascope movies, you are amortizing its cost.

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SEE FEBRUARY 1955 ISSUE OF POPULAR SCIENCE, PAGES 225-230 FOR BILL MORRIS' INTERESTING ARTICLE ON VISTASCOPE.

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"Am doing Radio and Television Servicing full time. Now have my own shop. I owe my success to N.R.I."—Curtis Stath, Ft. Madison, Iowa.

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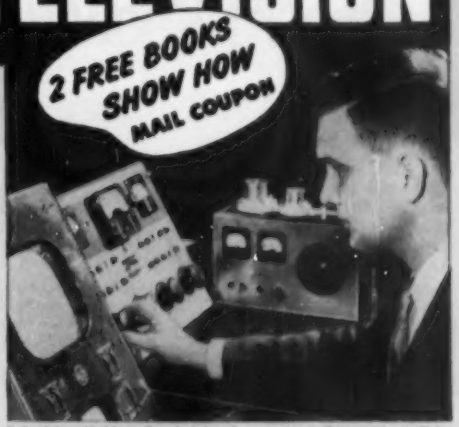
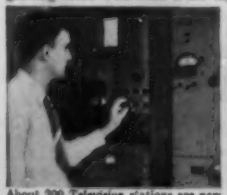


Television Making Good Jobs, Prosperity—Even without Television, Radio is bigger than ever. 115 million home and auto Radios are big market for servicing. 3000 broadcasting stations use operators, technicians. Government, Aviation, Police, Ship, Micro-wave Relay, Two-way Radio Communications for buses, taxis, trucks, R. R. are growing fields. Television is moving ahead fast.



About 200 Television stations are now on the air. Hundreds of others being built. Good TV jobs opening up for Technicians, Operators, etc.

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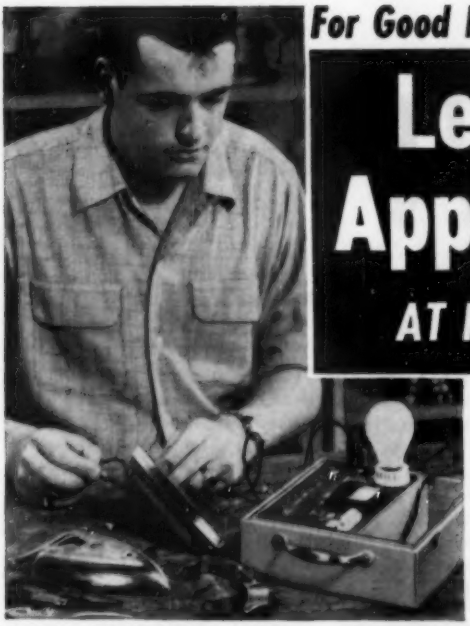

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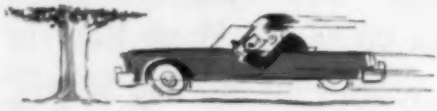
Letters

Speed vs. Psychology

According to the paper some guy wants speedometers in new cars to read only to 70 m.p.h. Says "if drivers could not ascertain if their car would go up to 100, there'd be a considerable reduction in speeds."

This is cockeyed and dangerous. To begin with, how many people really drive fast just to see the needle point way over? Besides, any guy with a watch and some grade-school arithmetic can tell his speed anyway—often more accurately than most speedometers. Besides, what's so all-fired safe about 70?



Does he think it's therapeutic to smack something solid at 69 m.p.h.? And this instrument would be positively dangerous for absent-minded drivers on long, straight roads—they'd creep up to 95 and think they were just going 72.

R. H. Hale Jr., Lake Charles, La.

Maybe. But H. G. Wells, pondering drivers' psychology, once argued that eliminating auto horns would reduce accidents. For the best brief letter defending speedometers as they are, we will pay $25; for the best brief one proposing modification, we'll pay another $25. Letters must bear a March, 1955, postmark.

Here's the Pitch

Your December article on the Buick Dynaflow [p. 129] indicates that the variable-pitch stator blades have a high angle of attack for the cruising range while the Buick Dynaflow handbook indicates a low angle of attack, and vice versa for high-performance range. I believe Buick is wrong.

Thomas Lefler, Albuquerque

You are right. The Buick booklet has been

INVENTORS

Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

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recalled by the factory and a new one, correcting the error, is being issued.

You have the wrong pitch regarding the setting of prop pitch in planes [Dec. '54, p. 129]. A prop "digs the most" at take-off and takes a lesser bite when in cruise.

A. R. Croci, Detroit

Not at all. A propeller in flat pitch moves (or displaces) less air at a higher velocity and, with increased pitch, moves more air at a lower velocity.

Wants New Calendar Quickly

I disagree very strongly about waiting until 1961 for this new calendar described in your January issue [p. 110]. I say the sooner the better.

I'm a postal transport clerk, and I like the idea of the new calendar because Christmas would come on Monday. That would mean that the Christmas rush would be over by Dec. 24, a Sunday. That would give us

a chance to relax and to enjoy the next day.

But I am against the idea of changing the dates of holidays so that they will all fall on weekends. The auto traffic situation on long weekends is bad enough now.

Roy K. Isakson, Enderlin, N.D.

Meet the Abominable Snowman

I read Gardner Soule's interesting article on "The World's Most Mysterious Footprints" back in your December issue of 1952 [p. 132], and I remember he said that scientists were going up the mountain again to investigate them further. Did they ever find out who belongs to those footprints?

Leslie Gombar, Detroit

An expedition that went into the high Himalayas in 1954 simply to look for the Yeti, or Abominable Snowman, found many footprints, followed them for miles and concluded that whoever made them traveled three times as fast as men.

All eyewitness descriptions of the Yeti by natives agreed that it is a small, squat beast the size of a teen-age boy. It is cov-

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ered with stiff red-brown and black hair. It has a flat face, like a monkey's; no tail; and normally walks on two legs. "There is no theoretical reason why there shouldn't be an unknown animal living there," said Charles Stoner, expedition zoologist.

Not-So-Cold New England

The weather map you printed with "Their Tallest Tales Are True" [Nov. '54, p. 112]

neglected New England completely as cold country. How come?

DICK WOLFE, Natick, Mass.

The U.S. Weather Bureau reports that record low temperatures for that area were 49 below on Mt. Washington, N.H., in March of 1872, and 50 below at Bloomfield, Vt., on Dec. 30, 1933. States shown as "cold" on our map were only those in which the temperature has dropped below 50 below.

Righting a Wrong

Just bought the January issue of your magazine and was proud to see my ship, the U.S. Coast Guard cutter *Eastwind* (WAGB-279) pictured opposite page 128. However, you quickly pricked my pride when I noticed the subtitle: "The *Atka* rides up and cracks the ice by sheer weight." The USS *Atka* [Navy] does not have the letter "W" preceding the numerals, which is characteristic of all Coast Guard cutters. Having made two Arctic operations aboard the *Eastwind*, I am writing to right a wrong.

HUGO H. SCHUMACHER JR., Dorchester, Mass.

The icebreaker was indeed the U. S. Coast Guard Eastwind, *as the writer of the article, who spent more than a week aboard this gallant ship as she cracked polar ice last summer, knows very well. In the original caption the ship was identified simply as an "icebreaker," and the* Eastwind *was mentioned later. Somewhere along the line the caption had to be shortened to fit. Since the Navy's* Atka *also is prominently mentioned in the article, it was carelessly substituted for the longer word "icebreaker."*

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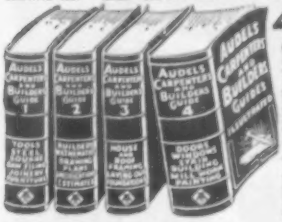

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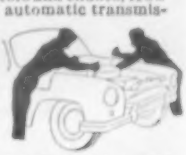

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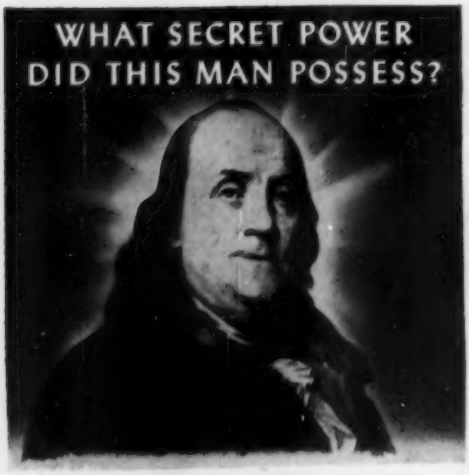

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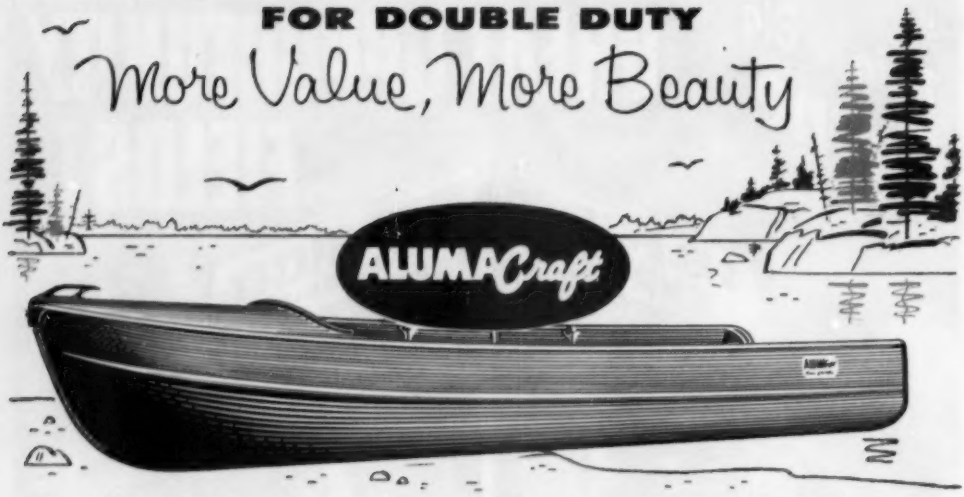

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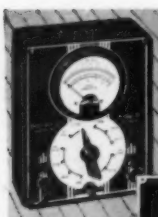

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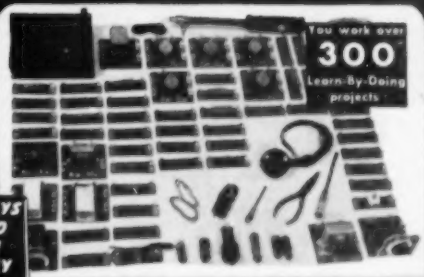

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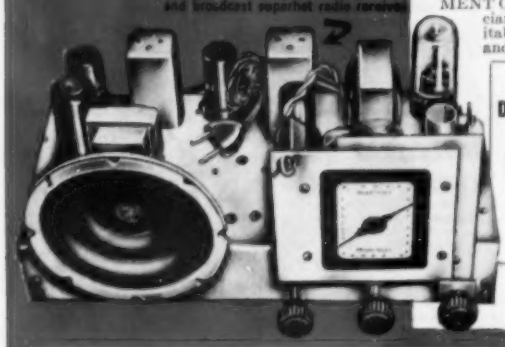

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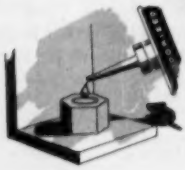

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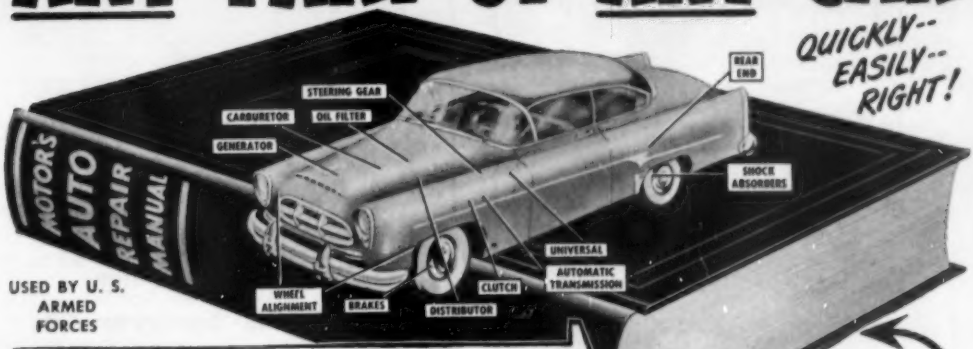

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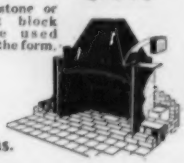

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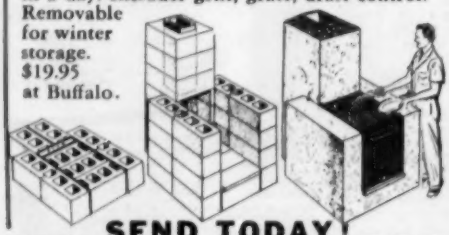

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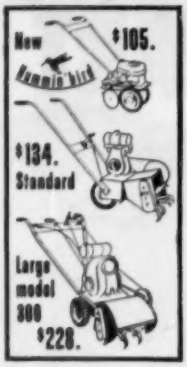

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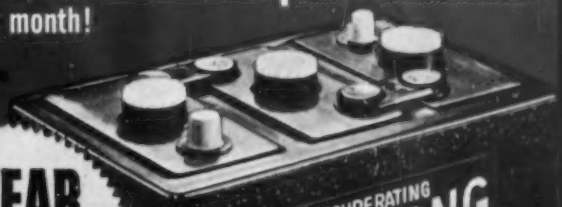

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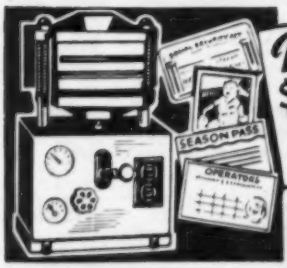

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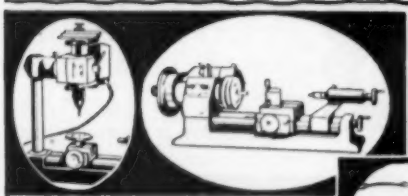

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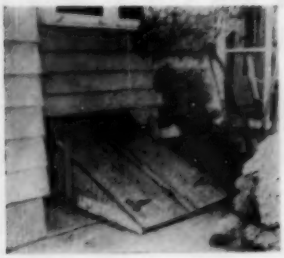

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The author is Associate Editor of *Electronics* Magazine. He spent FOUR years making this one-volume manual practical and easy-to-understand—even for an "unhandy" beginner.

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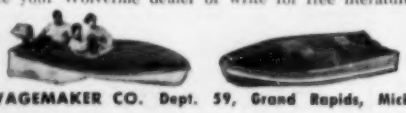

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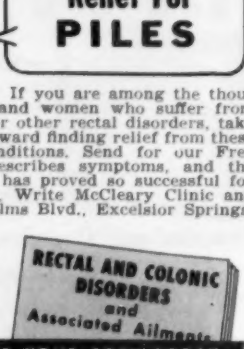

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640x15	5.68	750x16(6)	8.98	650x20	10.88	1000x20	19.98
650x16	5.78	800x15	6.88	700x20	12.88	1000x22	21.98
650x16(6)	6.98	820x15	7.48	32x6(8)	10.48	1100x20	20.98
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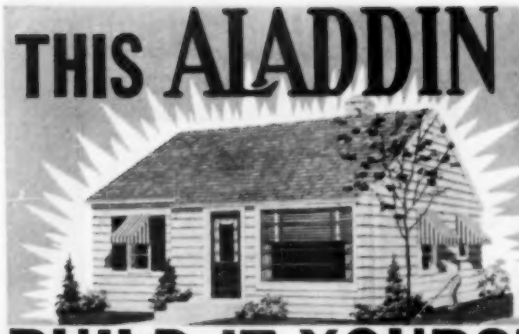

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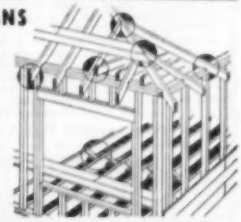

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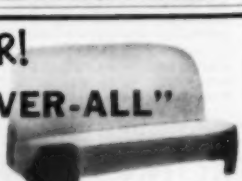

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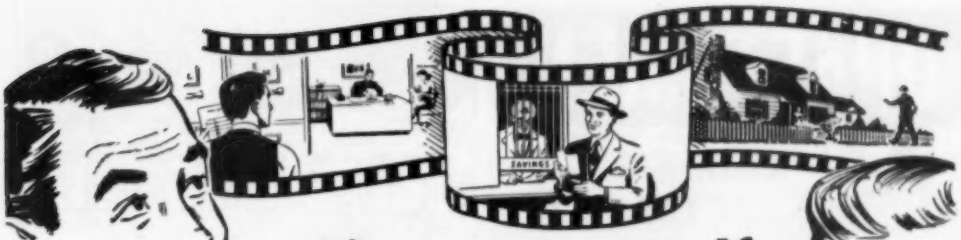

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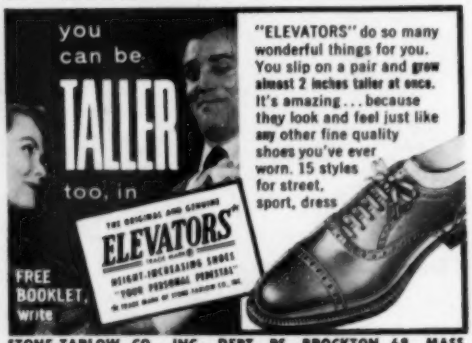

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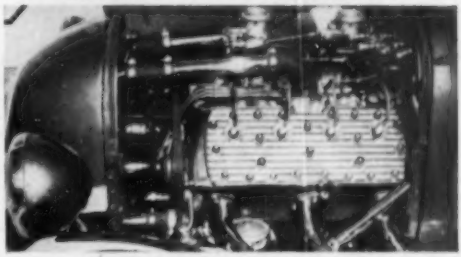

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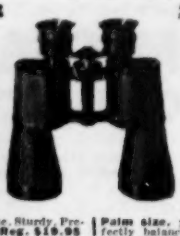

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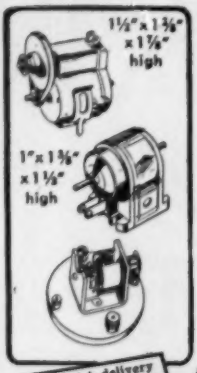

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650x16(6)	6.65	710x15	4.55	750x17	10.05	825x20	16.75
700x16	5.35	760x15	4.85	825x15	10.85	900x20	15.65
750x16(6)	7.25	800x15	5.55	600x20	8.05	1000x20	15.85
700x15	4.85	820x15	5.55	650x20	8.85	1100x20	17.65
550x18	3.75	670x16	5.05	32x6(8)	11.75	1100x22	20.05
550x17	3.75	760x16	7.05	32x6(10)	12.65	1000x22	16.85
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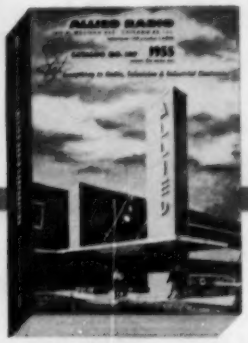

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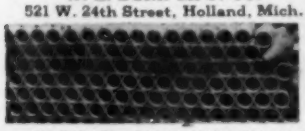

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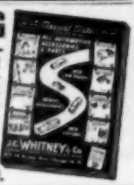

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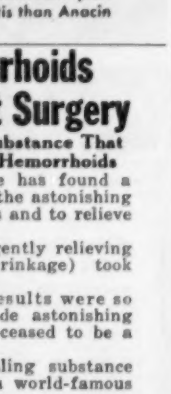

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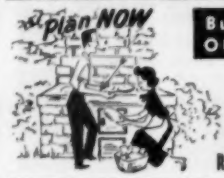

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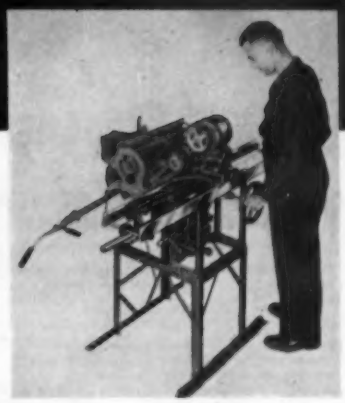

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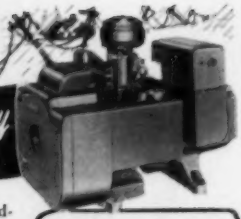

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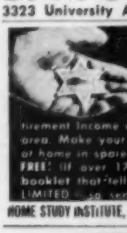

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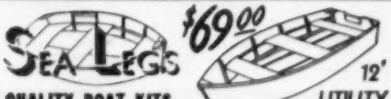

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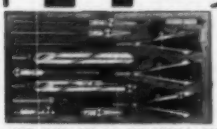

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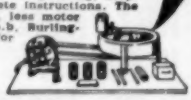

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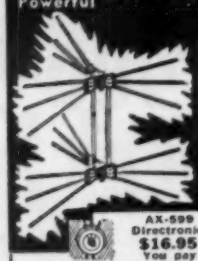

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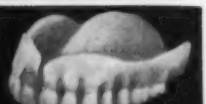

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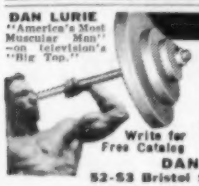

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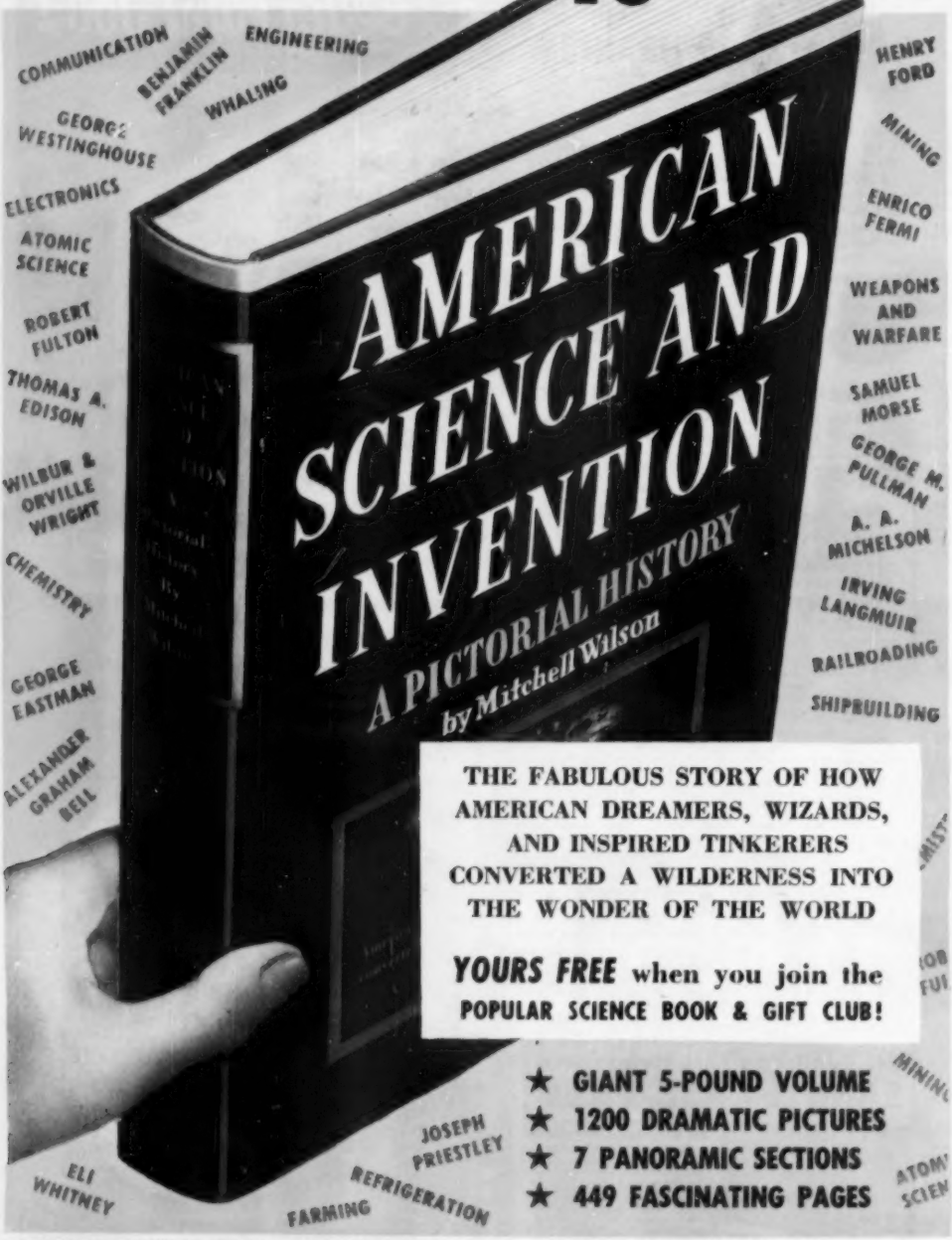

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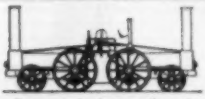

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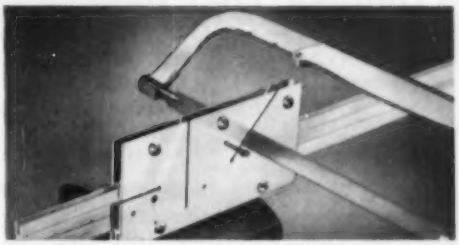

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By Jack M. Mason

What a fellow makes in his regular job today is hardly enough to make ends meet. Higher taxes, higher costs of food and rent and almost everything else raise hob with the savings account. And I say that what a fellow puts away is even more important than what he makes. It would worry me sick if I couldn't save a little against a rainy day.

And that makes it almost necessary to make some extra money. There are lots of ways to do it, too. The magazines and newspapers are full of ads for agents to sell things. But if I had to make a living by selling, from house-to-house, I'm afraid I'd starve to death. I like to make something with my hands and either sell it by mail or let the stores sell it for me. There are lots of people like me.

Another thing: Lots of men—and women, too—don't want to get mixed up with something that might hurt them on their jobs. They want a plan they can operate at home—in spare time—one that they can work at any time they please and one that doesn't need any rented store or hired help. And that's where my little money maker rings the bell.

Let's say you're like me. You want to make some extra money but you don't want to do any selling. All right—take a look at what you can do with this machine. I'll give you some facts that I discovered and your own common sense will tell you they're true.

If you're going to make something, it ought to be something that lots of people want—something that lots of people buy. It shouldn't be something that sells at just certain seasons—but all year 'round. And, it shouldn't be any flash in the pan. It's got to be steady—year after year—something that's not here today and gone tomorrow.

Well, give a thought to this: What's more permanent than babies? Ever since I can remember there's been more and more babies born every year. Last year three and a half million. This year more. Next year, more yet. Then answer this question and tie it in with your thinking: What's stronger than mother's love for her baby? And what is more powerful than love or sentiment in making people buy things. Now you've got the idea.

Every year millions of mothers want their babies' first shoes preserved as mementos. These mothers have the shoes "bronzed" as they call it—by electroplating. Electroplating coats the shoes with copper and preserves them forever. And there's no big company that has a corner on the business of metalizing baby shoes. Almost all of this work is done by little fellows in their kitchens or basements. Lots of orders come to you by mail when you send out circulars letting mothers know you can do the work. Lots of stores take orders, but they have to turn over the work to you. There are six or seven ways to get orders without making any house-to-house calls. The big job is keeping up with them.

You see, you can clean up six pair of shoes in a few minutes. In a few minutes more you can dip them in the hardening solution like you see in the picture. Then you spray them with a conductive coating and hang two pair in the tank on copper wires. Just turn the switch and walk away. The machine does the rest. Eight hours later those shoes are ready to take out of the tank, burnish and mount and ship or deliver. Two pair every eight hours, whether you are asleep, awake or at the movies. The materials cost 54c a pair. The retail price you get for electroplating is $6.00—so the profit is more than $5.00 a pair. Since you can do six pair a day you can see what the profit is, and the beauty of it is that the machine doesn't cost much. Almost anyone can afford the equipment and the book you get tells how to run the machine and how to get orders. Anyone can follow the instructions.

Of course, there's a lot more information than what I can give here. But write me a note or send me a postcard with your name on it and I'll send you all the information right away by mail. I'll show you how to start; what you need to buy; where to get it at the lowest price; how to get orders coming in seven different ways; and everything you want to know about the business. When you get all the facts, you can decide whether you want to get a "little money maker" of your own. Everything I send you now is free—no charge and no obligation. I'll be glad to help you get a start. Address me, **Jack M. Mason**, 1512 Jarvis Avenue, Chicago 26, Illinois. There's no catch to it. No one will call to try to sell you anything. I'll mail everything free, postage prepaid. Then you can decide. Write to me right away so I can help you get started making money.

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Advertising, Agencies for Advertisers ... 53
Agents Wanted ... 43
Authors Service ... 52
Antiques, Relics & Indian Goods ... 29
Auto Supplies & Equipment ... 2
Auto Trailers ... 3
Automobiles & Midget Cars ... 1
Aviation ... 5

Batteries, Generators, Etc. ... 6
Boats, Outboard Motors ... 11
Body-Building Courses, Jiu Jitsu, Etc. ... 12
Books & Magazines ... 23
Build It Yourself ... 66
Business Opportunities ... 37
Business Service, Information, Name Lists ... 50

Cameras, Photo Supplies ... 34
Camping Equipment & Tents ... 16
Cartooning, Sign Painting, Chalk Talks ... 54
Chemistry & Physics ... 41
Claim Investigators ... 37A
Coins & Currency ... 26
Contests ... 46

Detectives ... 47
Dogs, Birds, Hamsters & Pets ... 17
Drawing Supplies & Equipment ... 76

Educational & Instruction ... 45
Electrical Supplies & Equipment ... 7
Engines, Motors, Etc. ... 10

Farms, Other Real Estate ... 19
Field Glasses, Telescopes ... 14
For Inventors ... 60
For Sale Miscellaneous ... 71
For the Home ... 69
Formulas, Plans, Etc. ... 39
Frog Raising ... 18

Geiger Counters, Treasure Finders ... 77

Help Wanted ... 42
High-grade Salesmen ... 44
Hobbies, Collections ... 31
Home Craftsman ... 65
Hypnotism ... 24

Insurance Investigators ... 38A
Inventions Wanted ... 61

Language Outfits ... 48

Machinery, Tool Supplies, Etc. ... 9
Magic Tricks, Puzzles, Etc. ... 25
Manufacturing ... 63
Minerals & Precious Stones ... 30
Miscellaneous ... 79
Models, Model Supplies ... 64
Moneymaking Opportunities ... 38
Motion Pictures, Slides, Sound Equip. ... 33
Motorcycles, Bicycles & Supplies ... 4
Music, Song Writers & Records ... 35

Of Interest To Women ... 70
Old Gold, Jewelry, Watches ... 67
Old Stamps Wanted ... 27

Patent Attorneys ... 59
Patents For Sale ... 62
Personal ... 80
Photo Finishing, Photocopies, Etc. ... 32
Plastics ... 40
Plays, Stories, Etc. ... 49
Poultry & Supplies ... 21
Printing, Multigraphing, Etc. ... 57
Printing Outfits, Supplies ... 58
Profitable Occupations ... 22

Radio, TV, Supplies & Equipment ... 36
Razor Blades, Shavers ... 74
Rubber Stamps & Office Supplies ... 56

Special Services ... 51
Sporting Goods, Guns, Fishing Tackle, Etc. ... 15
Stamp Collecting ... 28

Tattooing Supplies ... 75
Taxidermy ... 13
Tobacco & Pipes ... 68
Trees, Shrubs, Roots & Herbs ... 20
Typewriters & Office Machines ... 55

Wanted to Buy & Swap ... 72
Watch Repairing ... 78
Wearing Apparel ... 73
Welding, Soldering ... 8

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PENNY Approvals jammed with Bargains. For better values, try Putnam Stamp Company, Mahopac, New York.

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1000 DIFFERENT 50c approvals. Ouellette, Box 66 Flint, Fall River, Mass.

U.S. Approvals, mint, used! "Square Deal Teall", 661 Beach, Rochester 12, N.Y.

BRITISH Colonies. 100 different only 50c. Thompson, 906-22b Ave., N.E., Minneapolis, Minn.

U.S. Plate blocks—Fate knocks! Late date may lock gate on flocks of blocks. Begin this fascinating collecting adventure now. $1.00 brings you 6 different commemoratives, approvals, details. Wm. Kuehl, 2125 East E, Tacoma 4, Wash.

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EXOTIC Indian states 26 different 10c, approvals. Excello, Box 489, Red Bank, New Jersey.

SUPERB Approvals. Stamps ½ to ⅛ catalog. P. G. Beals, 125 Tremont St., Boston, Mass.

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1000 PINE Mixed U.S. 25c. Wright, 723 Washington, Hagerstown, Maryland.

FREE U.S. 34 different with superior approvals. Sparta, Box 1062, Rochester 3, New York.

WANTED—Stamp Collections, Accumulations—Murray Gold, 62-95a Saunders, Rego Park 74, N. Y.

FREE! $10,000 Airmail! Pictorials. Commemoratives! Approvals. Keating, 2520 Boulevard, Jersey City, N. J.

FREE French West Africa Pictorials, approvals. Eagleco, 6916 Roosevelt, Philadelphia 49, Penna.

FREE Packet, good stamps. Discount approvals. Klein, 1715-S Caton, Brooklyn 26, N. Y.

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FREE 50 France. Approvals. R. Werner, 1844 W. 5th, Davenport, Iowa.

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GENUINE Quartz Crystal Stars. 60 sparkling facets. Drilled for earrings, pendants. ⅛" $12.00 doz., sample $1.75. Wholesale jewelry catalog 50c. Diagem Jewels, Hampton Bays 10, New York.

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GEMSTONES, Mineral specimens. Geiger Counters, uranium samples. Every variety. Lowest prices. Free booklet. Plummer's, 4720 Point Loma Avenue, San Diego 7, Calif.

FACTS for rockhound trips, uranium, prospecting, lapidary hobbyists, every month; 12 issues, $1.00. "National Prospectors Gazette", Bellflower 51, California.

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TEN N. Mexico minerals $1.50, six fluorescents $1.00. Fools Gold 25c. Free lists. Hartson, Winston 5, N. Mex.

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INVENTING can be an interesting and profitable hobby. Write for complete particulars. Institute of American Inventors, Dept. 30-E, 631-E St., N. W., Washington 6, D. C.

NAZI Emblem sample and catalog 25c; 37 different American emblems $1.00. Hobbyguild, 580A Fifth Avenue, New York.

50 DIFFERENT army embroidered patches $1. Other bargains. Insignia Mart, 703B Broadway, N. Y. C. 3.

INSECT specimens. Free catalog. Nature Supply Co., 52 East 19th Street, New York 3, New York.

WANTED — Cigarette, tobacco cards. Write Charles Bray, East Bangor, Penna.

UNUSUAL Hobby: Authentic Army patches, insignias, ribbons, enameled crests, 50 assorted for $1.00. Rex Military, 1186 Broadway, N.Y.C.

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FREE! Leathercraft catalog. Do It Yourself! Tandy Leather, Box 397BH, Tulsa, Okla.

20 DIFF. Seashells—$1.00. World—26 W. 18th St., N. Y. 11.

32 PHOTO FINISHING, PHOTOCOPIES, ETC.

PARTICULAR? Custom Finishing Guaranteed. 8 Jumbos 35c, 12—50c. Special! 35mm 36 exposures $1.10. Free Mailer. Flash-Foto, Box 36H, Brooklyn 4, N. Y.

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TAPE Recorders, Tapes, Accessories. Unusual Values. Dressner, Box 66, Peter Stuyvesant Station, New York 9.

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FREE! Blackhawk's Spring sale catalog new and used 16mm., 8mm. films, used 16mm. sound projectors, new 2"x2" color slides. Blackhawk Films, 1154 Eastin, Davenport, Iowa.

BUY Surplus projectors, sound equipment, film from government. List $1.00. Box DA169 East Hartford 8, Conn.

34 CAMERAS, PHOTO SUPPLIES

GOLDE 2x2 Numanumatic projector, 300w blower, $41.44. Viewlex V-33L projector, 300w blower, $43.25. TDC Headliner, 200w, $24.42. SVE Skyline 500, 500w blower, $57.70. All factory boxed. Free bargain catalogue. Dealer's Mart, 54 Beverly Rd., New Rochelle, New York.

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BASS Says: Quality Cameras Since 1910. When in Chicago visit the Camera Cross Roads of the World . . . or write us for your favorite equipment, new or used. Satisfaction Guaranteed. Bass Camera Co., Dept. AG, 179 W. Madison Street, Chicago 2, Illinois.

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WANTED! Poems for musical settings. Write Songwriters' Service, Clifton, N. J.

POEMS Wanted for musical setting. Send poems. Free Examination. Five Star Music Masters, 646 Beacon Bldg., Boston, Massachusetts.

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FREE Records of your song—Your words—My Melody. Free information. Johnny Mack's Melody Mart, 1094 West 39th Street Dept K Los Angeles 37.

POEMS Wanted to be set to music. Free examinations. Send poems. McNeil Master of Music, 510-PS, S. Alexandria, Los Angeles, California.

POEMS Wanted for musical setting. Send poems. Free examination. Crown Music Company, 1472-P Broadway, New York City 36.

POEMS needed for new songs. Send poems for free examination, details. Immediate consideration. Songcrafters, 2724 Arcade Station, Nashville, Tenn.

SONGWRITERS: Large recording company may record your song. National sales and promotion if selected. No Charge for Melodies. Send song material to Music Makers, Dept. G-7, Box 2507, Hollywood, California.

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SONGWRITERS! Send poems, songs. Music Service, 243 West 72nd St., PS, New York 23.

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POPULAR Songs. How to write and sell them. Write for free booklet Successful Songwriting. Gateway Songs, Box 2470, Hollywood 28, California.

1955 ACCORDIONS — Wholesale. Free catalog. American Accordion Center, PS-J, 3329 Belmont, Chicago.

36 RADIO, TELEVISION, SUPPLIES & EQUIPMENT

MAKE Simple, Tubeless, Batteryless, Distance-Getting radio. Genuine Melomite crystal, Detector, Illustrated instructions, 50c postpaid. Allen, 427-PS5, Clinton, Mo.

FREE Radio Tester, Soldering Iron. Build and keep 15 high quality Radios—only $19.95 complete. No experience required. Enclose 25c for valuable Radio-TV Repair Guide and Kit Catalog. Progressive "Edu-Kits" Inc., 497 Union Ave., Dept. PS-27, Brooklyn 11, New York.

TV Trade-in sets. Philco, R.C.A., Emerson, others. List available. 10"—$17, 12" to 17"—$20 up. Washtek Service Co., Dept. S. 1501 Boston Road, Bronx, N. Y.

45% OFF 40,000 Cycle Hi-Fi amplifiers, recorders, tuners, speakers, microphones, movie equipment, typewriters, pianos, accordions. Belmart, 466 Belmont, Paterson, New Jersey.

CRYSTAL Set book. 132 illustrations, charts, circuits. Over 18,000 words. Refund guarantee. $1.00. Kott, 5026 St. Clair, Detroit 13, Michigan.

BUILD Super crystal radios. Electrotomic crystals, detector, instructions 50c. Electrotomics, Box 985, Dixon, Missouri.

GEIGER Counter and Metal Detector Kits. Inexpensive, Educational. Free Literature. Electronic Applications, Dept. A, 5024 Lee Hwy., Arlington 7, Va.

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TV Tube trouble information and location chart. Locate defective tube by picture tube screen. Send $1.00 with make and model of your set. NW TV Specialties, Box 1013, Seattle 11, Washington.

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MAKE simple powerful distance-getting crystal radio. Works anywhere. Illustrated booklet fifteen cents. Money back guarantee. Francis, Box 5963, Cleveland, Ohio.

15 TESTED One-tube circuits 25c, including "Radio-builder," catalog. Laboratories, 328-T Fuller, Redwood City, Calif.

SUPER Pocket radio. Owners report coast-to-coast reception. Complete kit $2.99. Batteries $1.10. Tiny hearing-aid earset $2.95 or use any regular headphone. Will ship C.O.D. with $1.00 deposit. Rush order to-day. Satisfaction guaranteed. Transi-Mite Labs, Manteo, North Carolina.

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INCREDIBLE! One tube radio receives television, FM, aircraft, and amateurs without antenna or ground wire. Diagram with special tube $2.00. Wired assembly $2.00. Springfield Enterprises, Box 54-A3, Springfield Gardens 13, New York.

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WE Love our mailman—He leaves over $1,000.00 monthly in our rural mailbox. My college professor husband drafted a scientific home mailorder method. We bought a Texas ranch, live as we always wanted. Now we sell the "Ranch Mailorder Method." Operates anywhere. Inquire: Eveningshade Ranch, Helotes, Texas.

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$1,000 MONTHLY possible in collection agency business. Free details. Write Cole Associates, Syracuse 2, New York.

GROW Orchids at home—profitable—fascinating. Year 'round. Maine to California. No Greenhouse. Gorgeous Cattleyas, Cymbidiums, etc. Successful home grower shows you how. Free—full details. Flowerland, 4622-TW Wilshire, Los Angeles 5.

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MAKE extra money. Address, mail postcards. Spare time every week. Write Box 14, Belmont, Mass.

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BE appointed state notary public now. Write—Stationers, Helotes, Texas.

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MAKE Big Money At Home! Invisible Reweaving pays up to $10.00 profit in an hour. Make tears, holes disappear from fabrics. Constant demand from laundries, cleaners, homes brings steady earnings. Details Free. Fabricon, Dept. AF, 8342 S. Prairie, Chicago 19, Illinois.

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I Average $125 weekly selling books by mail! So can you! Start sparetime! Work home! Cooper, 247-S Taunton, Buffalo, N.Y.

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MAKE Money growing miniature trees on your window sill. Free seed and plan. National Nursery, Dept. GC, Inglewood 4, Calif.

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BREED Rare Tropical Fish at home. Earn Big Money! Learn Secrets! Help fill huge demand. Amazing Opportunity! Free Plan. Tropical Fish Breeders, Los Angeles 61, Calif.

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ADDRESSING Typing Materials furnished rush 25c. Hustlers Club, Alger, Mich.

HONOLULU firms need workers. Details $1.00. Pomeroy's, # 3 Campbell Block, Honolulu, Hawaii.

43 AGENTS WANTED

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MAKE extra money. Address, mail postcards. Spare time every week. Write Box 14, Belmont, Mass.

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C. A. Snow & Co.—S-427, Snow Building, Washington 1, D. C. Registered Patent Attorneys. Write for information.

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PATENT Applications prepared and amended. Searches made. L. S. Saulsbury, Registered Patent Attorney, 605 14th St., N.W., Washington 5, D.C. and 55 West 42nd St., New York 36.

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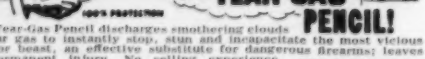

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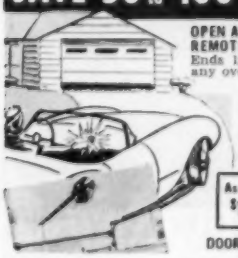

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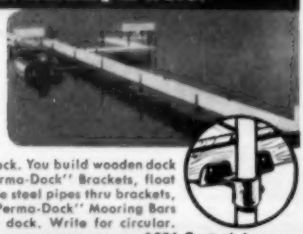

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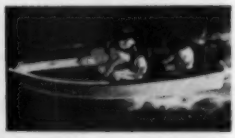

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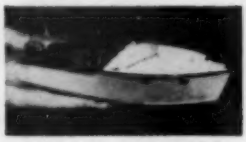

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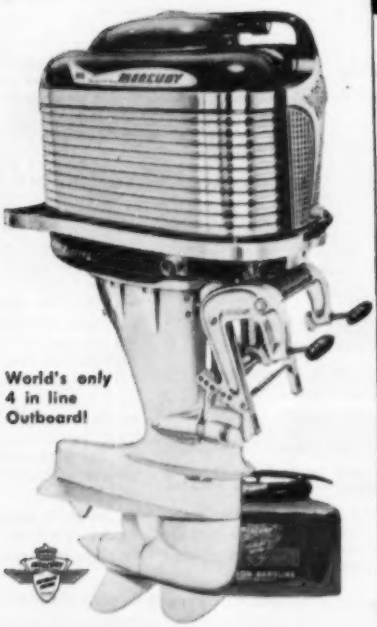

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Special lubricants? They were all using oil you could buy anywhere for about 40¢ a quart.

The secret? Better oil filtration. Here's why: the moving parts in your engine never touch each other. They're always separated by a thin film of oil. Keep abrasives from getting into that film of oil and, *theoretically*, your engine should never wear out.

Today, the development of two inventions makes it possible for any engine to approach the life and performance that engineers know is theoretically possible. Here are the two inventions:

One is a simple $3.95 Fuel Monitor designed to give you improved carburetion, more miles per gallon, smoother idling and increased speed and power.

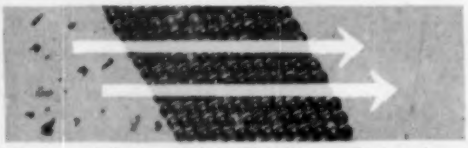
The other is a revolutionary anti-acid, anti-friction Life-Time oil filter which has already increased engine life to 250,000 miles in highway tests.

Both of these inventions are possible only because of the discovery of an amazing metal—sintered bronze.

What is Sintered Bronze and What Good is it?

We make sintered, or porous, bronze by fusing together millions of tiny bronze balls under heat and pressure. The result is an extremely fine screen—much finer than any screen that could be woven of metal or even cloth.

Originally, sintered bronze was used mainly to filter liquid oxygen and other extremely cold rocket and jet fuels, plus superheated gases.



Carbon and abrasives can't get through spaces between bronze balls; oil stays dark, proving no additives have been removed.

Our engineers used this experience to pioneer the development of the Life-Time* automotive filter you have read articles about in magazines like this one.

The Life-Time Fuel Monitor: How it Works

If you've ever dropped a lighted match into a pail of gasoline, you know that *gasoline won't explode*. Only gasoline *vapor* will explode. The more raw, unvaporized gasoline your carburetor delivers to the cylinders, the more gas you waste. The more highly vaporized a mixture your carburetor puts out, the more mileage and power you get from your gasoline.

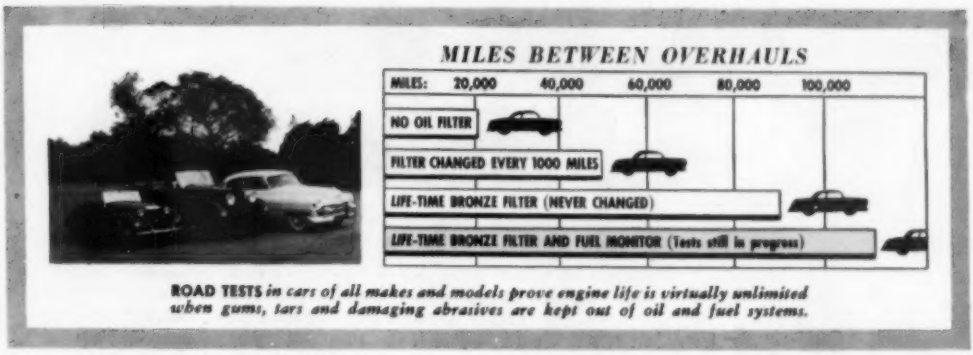
Increased Vaporization

Most improved carburetors try to increase vaporization by doing something to the gasoline *inside* the carburetor. The *Life*-Time Fuel Monitor simply tackles the same problem in a different way *before* the gasoline gets to the carburetor. Attached to your carburetor just like an ordinary gas filter, the *Life*-Time Fuel Monitor has a porous bronze element which:

(1) removes water from gasoline, plus tiny amounts of low-volatility petroleum tars which interfere with complete vaporization;

(2) tends to equalize gasoline pressure;

(3) removes gums, rust flakes and other impurities before they can foul carburetor jets permanently or even momentarily. Result: you save $20-$35 in periodic carburetor cleaning expense, and get improved mileage and performance.



Genuine Life-Time Oil Filter Gives Your Engine 250,000-Mile Protection Against Acid, Abrasive Damage

Here's the original, genuine *Life*-Time* permanent bronze oil filter tested and approved by the editors of leading automotive and scientific magazines. The only bronze oil filter ever to pass government shock and vibration tests, the genuine *Life*-Time* filter removes *all* abrasives—including granular, diamond-hard carbon which gets through other filters—plus acid-producing water. In addition to *preventing acid formation*, the *Life*-Time oil filter has a special acid-neutralizing component which *actually destroys residual acids that have already formed in your oil system.*

How the Life-Time* Oil Filter Works

Test vehicles have already exceeded the 250,000 mile mark with the *Life*-Time* filter. You never change it; just rinse it out and it is good as new.

Dirty oil enters at top. Impurities, stopped by bronze screen, fall to bottom of case. Filtered oil, including additives, returns to lubrication system.

Try the Life-Time Fuel Monitor and Life-Time Oil Filter for 30 Days at Our Risk!

You can try either or both on this guarantee: you must be convinced they do everything we say, or money back, no questions asked!

For complete *Life*-Time oil filter unit, including case (fits any car), send make, year and model of your car and $12.95 (we pay shipping).

Life-Time oil filter conversion kit, which replaces your present filter pack with Life-Time bronze, is $6.95 for most cars (send make and number of present filter when ordering). Conversion kits for Buicks with hydraulic lifters and for cars with full flow systems: $13.95.

Or send only $2 deposit, pay C.O.D. charges on arrival. But do it today—don't waste another cent on filter pack replacements!

To try the Life-Time Fuel Monitor, simply send $3.95 (we pay postage) or send $1 deposit, pay C.O.D. charges on arrival. If you're not convinced in 30 days it's worth four times the price: money back, no questions asked!

LIFE-TIME PERMANENT BRONZE FILTERS

Continental Manufacturing Corporation, Dept. CPS-3
Washington Boulevard at Motor Avenue, Culver City, California © 1954

*Don't confuse the original, genuine *Life*-Time filter with imitations and "improved" substitutes. Only the original, genuine *Life*-Time filter has passed government shock and vibration tests and meets military filtering requirements. Look for this trademark: LIFE-TIME

DEALERS AND DISTRIBUTORS: find out how you can cash in on demand generated by two-page and four-page ads in national magazines, plus radio and TV network shows and full-page newspaper ads. Write today for full information on *Life*-Time Fuel Monitors, Oil Filters, Batteries, Spark Plugs and Power Brakes. Continental Manufacturing Corporation, Dept. CPS-3, Washington Blvd. at Motor Ave., Culver City, California.

Continental Manufacturing Corporation, Dept CPS-3
Washington Blvd. at Motor Ave., Culver City, Calif.

Gentlemen:
I will road test the products checked below in my _____ (make, model, year of car)
(___) Fuel Monitor ($3.95)
(___) Oil Filter ($6.95 for conversion kit; $13.95 for full-flow; $12.95 for complete unit, including element).

I enclose (___) cash; you pay shipping
(___) $2 deposit; will pay C.O.D. charges on arrival.
You will refund my money for either or both products if I return them within 30 days.

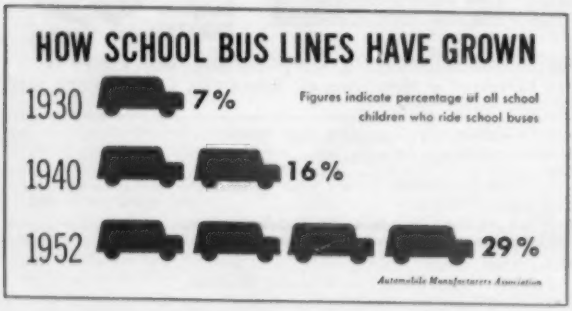
Name _____
Address _____
City _____ Zone ____ State _____

POPULAR SCIENCE MONTHLY'S . . . Last-minute news & notes

NATURE'S SECRET PROCESS FOR MAKING FOOD FROM SUNLIGHT--photosynthesis--has finally been unraveled by a University of California team headed by Dr. Daniel I. Arnon. By imitating this process, chemists could manufacture actual food without the help of any living plant. Dr. Arnon found the plants' food factories were chloroplasts, small particles containing chlorophyll. In the chloroplasts sunlight breaks down water into hydrogen and oxygen. The oxygen combines with phosphorus chemicals to make a compound called ATP. The hydrogen and ATP then use carbon and other chemicals to create sugar and starch...AN ELECTRONIC BRAIN STRETCHES ACROSS NEW YORK, MASSACHUSETTS AND OHIO to solve problems for General Electric. Turbine factories at Schenectady, N.Y., Lynn, Mass., and Evendale, Ohio, are interconnected with two IBM computers, one in Evendale, one in New York City. Problems are funneled to Evendale, solved there or in New York, and the answers quickly wired back to the factories.

YOUR CHANCES OF PULLING THROUGH A MAJOR OPERATION ARE TWICE AS GOOD as they were 10 years ago, a Metropolitan Life Insurance survey indicates. In several instances the odds have improved even more, with death rates cut by four-fifths during the past decade.

NEARLY A THIRD OF ALL SCHOOL CHILDREN GET FREE RIDES to their classes. School-bus service, which carried less than two percent of all pupils 35 years ago, by 1952 involved 131,000 vehicles costing $266,000,000 to operate...BULLDOZER BLIGHT IS KILLING TREES IN MANY NEW DEVELOPMENTS, says tree expert Rush P. Marshall. Even when dozers don't uproot the trees, they take away so much topsoil and pack down what's left so hard that trees often die in a few years.



A ROCKET ENGINE THAT CAN BE STARTED AND STOPPED, throttled up and down as the pilot chooses, has been developed by Curtiss-Wright. Previous airplane rockets offered much less control.

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PLEASURE AND FUN FOR THE ENTIRE FAMILY!

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Ultra precision engine as carefully machine-tooled as giant army engines. Cylinder is honed to .0001 and hand fitted to its individual pistons.

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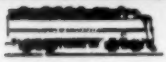
SEA BABE SPEEDBOAT. 12½" with Electric motor, fully assembled, including fittings. **$4.95**



VARNEY TRAIN OUTFIT.
88 wheels a-rollin',
ready to run Twin-drive loco (shown) with trailing B unit and 9 other assorted cars, including freight, flat, tanker, caboose, etc. Magnificent detail, sturdy construction. Also includes 22 sections of snap-together track and power-pak. Absolutely complete **$49.95**

BIG 3 CRAFTINT OIL PAINTING OUTFIT. Start painting at once. Contains everything you need. Three 12"x12" mounted panels, numbered and ready for painting. Large jars of brilliant pure oil colors, plus 3 artist's brushes. Crucifixion and other religious subjects. Set of 3 **$3.95**

TURRET MICROSCOPE 100-300x power. A real scientific instrument for exploring the unknown. Well constructed. Precision lens. Fine adjustments. Includes 130-page detailed guide containing photos and interesting information **$17.50**

HIGHWAY PIONEER CAR SETS. (Model shown 1910 Ford) Authentic reproductions of cars from nostalgic early days, plus today's foreign sport cars. Begin your collection with these models. Easy to build. Kit contains all parts and paint, brush and cement. Available in these models: JAGUAR, MERCEDES, ROLLS ROYCE, STUTZ BEARCAT, FORD. Set of 6 complete **$4.95**

ASTRONOMERS TELESCOPE WITH TRIPOD
30x power. Beautifully designed, compact telescope for viewing the heavens. Precision ground lens. Complete **$23.00**

ONE TUBE RADIO KIT Not just a toy, but a precision engineered radio with modern circuits and tubes. Will receive local and long distance stations **$7.00**

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POPULAR SCIENCE
REG. U. S. PAT. OFF. Monthly

Motorcyclists are losing their roughneck reputation. In many places the newest thing is to join the cops, not buck them.

How They've Halted Delinquency on Wheels

These two policemen helped turn the tide

HIGHWAY PATROLMEN Ez Ehrhardt (left) and Chuck Pollard, once amateur cyclists themselves, are leaders in California's drive to tame the wild men among the state's 52,000 motorcycle riders. Although they have handed out summonses by the hundreds, they are still widely liked and respected.

By Andrew R. Boone

RUNNING feuds between ranchers and homesteaders never held a candle to the undeclared war in California, a few years back, between cops and motorcyclists. Bloody accidents, mass arrests and some skin-crawling riots marked the campaigns. And it was growing worse.

That's over now. Peace prevails, thanks in large part to the extraordinary work of two state patrolmen who devised a neat twist on the old rule "if you can't lick 'em, join 'em."

Here are some examples this spring:

- In Ventura, a snappy, gun-toting outfit of 25 motorcyclists performs virtually all the jobs of regular police. They regulate traffic, keep the peace at fairs and fiestas, help search for escaped criminals and supervise sports-car and motorcycle races all over the southern part of the state.
- In Salinas, the 15-man Sheriff's Motorcycle Squad, drawn from the local cycle club, handles special traffic problems, sets up roadblocks, fans out through the hills to search for lost kids or crooks on the run. Their special blue uniforms have become a symbol of law enforcement.
- In Oakland, the police depend on a 49-man cycle auxiliary, hand-picked from the local club, to handle tough situations like unjamming traffic around big fires

Top, traffic jam in race policed by Ventura patrol. Bottom, a supervised cross-country.

or dispersing crowds at disaster scenes. They've got the authority to be tough if need arises. Lt. N. C. Danielson, deputy chief of civil defense there, lists another advantage: Two-wheeled bikes can move to trouble spots fast, along sidewalks and across lawns where patrol cars can't go.

Elsewhere in the state this same improvement of cyclists' reputation is evident. In Monterey Park they climbed a mountain to rescue the victim of a plane crash—and got there ahead of a rescue party on horseback. In San Diego, in Modesto, and in Redlands, the clubs have annual affairs for charity. San Francisco's motorcyclists attend a special early mass together at St. Gertrude's, and Father Paulson blesses their bikes.

Cyclists change their spots. Seven years ago in California the motorcyclist was almost universally disliked. Many cops took grim pleasure in arresting riders for the slightest infractions. Cyclists traveled in groups or gangs, and more than one community suffered under the impact of roughneck cycle invasions. Motorcycle accidents hit a high of 4,889 in 1948, and a shocking 196 persons died.

How did California bring the rampaging cyclists under control? It took me 1,000 miles of driving and scores of talks with police chiefs, sheriffs, and motorcyclists themselves to find out.

In Sacramento, at the headquarters of the California Highway Patrol, I got my first surprise. "Not for two years," said W. A. Huggins, CHP safety officer, "has *a single report* of racing on the highways or illegal mufflers reached my desk." He added, "Be sure to see Ehrhardt and go to Hollister before you do your piece."

Hollister is a quiet valley town 93 miles south of San Francisco. It was destined, eight years ago, to make a new low-watermark in motorcyclists' roughneck reputation. But it also touched off the steps that have made motorcyclists respectable people throughout the state.

At five o'clock in the afternoon of July 3, 1947, Ez Ehrhardt, a young highway

Johnny Gale, captain of Ventura patrol, inspects his volunteers and their private mounts.

patrolman with three years of service under his gun belt, leaned forward to adjust the car receiver and caught the broadcast: ". . . riot in Hollister."

For the first time since the war cyclists throughout the state were staging a Gypsy Tour, and 4,000 of them had brought their noisy machines into the little town for a weekend of racing and fun where they could find it.

The Highway Patrol had sent 34 other officers to help local police try to restore order. Tear-gas guns and gas grenades had been issued. "But for 35 of us to try to stop that scramble," Ez told me, "would be like throwing a cupful of water on a roaring blaze."

Before the ruckus ended, five onlookers, struck by cycles careening over the curbs, were carted off to the hospital. Thirty men and boys ultimately spent a grand total of 407 days in the clink for drunkenness or reckless driving.

Knotheads. Ez Ehrhardt tells how tough the situation seemed at first: "'I don't suppose we can talk to those knotheads,' Captain Torres told us, 'but talking is better than gas.' So Captain Torres took one side of the street and I took the other. 'You've got 10 minutes to get out of town,' I told the roughneck groups. We scattered soap chips over the street, and we got an orchestra started playing. Soon the street was filled with dancing couples. Late that night Hollister looked like a ghost town—everybody left was sacked in to sleep it off."

In the months that followed, Ez Ehrhardt grew convinced that motorcyclists would have to learn to behave or lose what little respect they still commanded. Many of these riders were his friends, and he knew that they were defying more than the law. One rider out of 12 was killed or injured in California that year. By mid-1948 Ehrhardt got permission for a three-month education plan.

Letters to 87 clubs stated that he would attend meetings if the members wanted to hear his pitch. His first acceptance

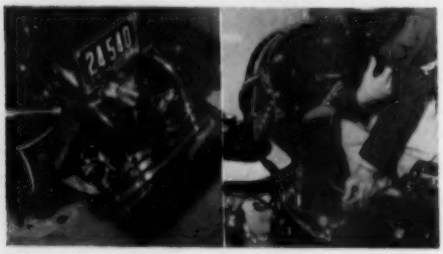
This volunteer patrolman drives a white-walled cream puff

DOLLED-UP Harley-Davidson 74 OHV cost $1,850 with its luxury extras. Its owner, mechanic Wayne King, uses it on Ventura patrol.

TRUMPET nestled behind the roll-over bar is a horn with a soft, clear note instead of the usual impudent beep. This big machine weighs about 695 pounds and can hit 100 m.p.h. Hydraulic front fork deflects 7½ inches, rear one 3½, and the seat posts 2¼. The ride is smooth.

BRINGING UP REAR are red tail light, two white stop lights, bumper. Saddlebags flank wheel.

TILT UP the big seat and there's the oil-tank and battery. The 57-hp. engine gives 41 miles a gallon.



came from San Francisco's Bay City Club. "You guys," Ez told them grimly, "have got to save your own skins. If you want to play, get off the highway--take to the tracks and hills. Don't race on the roads. Use staggered riding formations, and never ride two abreast. Pull way over when cars are passing. And keep your equipment legal."

About then 700 riders converged on Friant Dam for a hill climb. Ez and two other officers parked their bikes a couple of miles away. In a few hours they made 67 arrests, mostly for noisy mufflers or straight pipes. The next week, at another gathering, they ticketed 59 of 500. Two weeks later, 19 tickets went out among 400 riders. After each ticketing session, Ez would ride in and join the crowd. Nonbelievers soon learned that he wasn't a mean cop, and that it didn't cost much to get legal. Today he hands out only four or five tickets at the biggest events.

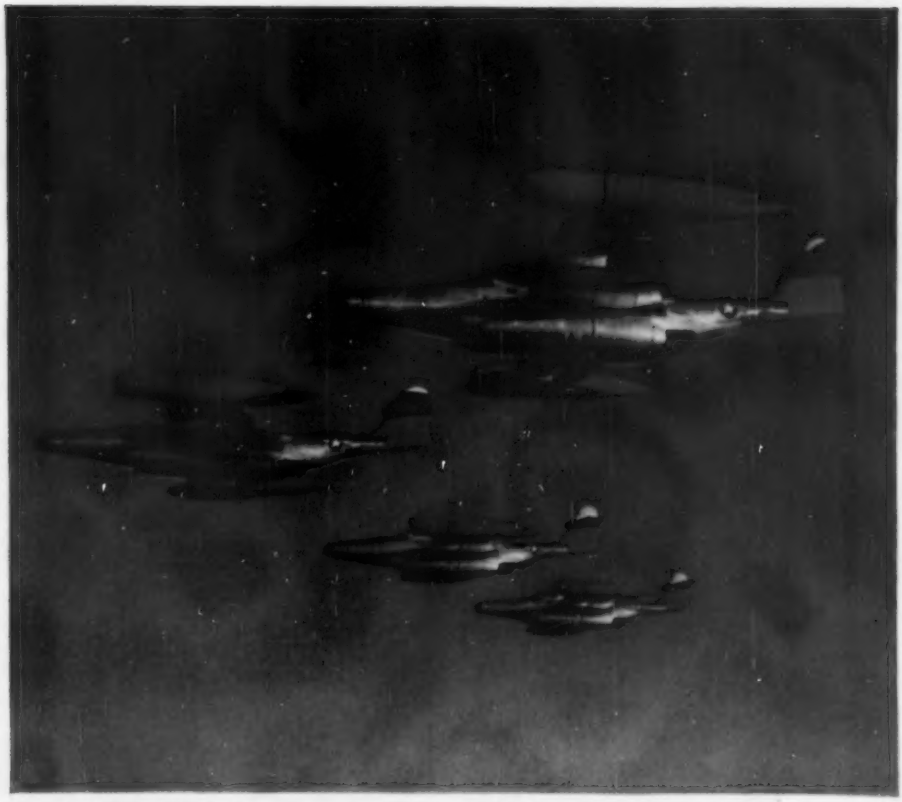
Success breeds success. Soon another officer was detailed to help calm motorcyclists in southern California. Chuck Pollard, like Ez a former amateur cyclist, got the assignment. Often Ez and Chuck would team up at big events, first checking cycles as they arrived and then helping out with the events. Drunks got a choice: quit drinking and driving or go to jail.

The next, and crucial, step was a natural one: They put the biggest and rowdiest riders to work directing traffic, patching up the injured, helping stage the shows. A little responsibility and a little authority worked wonders. "Many of those cycle hounds," Chuck told me, "have now become fine patrolmen."

The three-month assignment of Ez Ehrhardt afterwards grew into full-time duty for both Ez and Chuck and two other officers. They are widely known among cyclists throughout the state—and widely liked as well.

One day a couple of years back Pollard went on what he thought was a routine assignment to some cycle races at Box Springs. It proved to be a giant-sized surprise party, with 6,000 people

[*Continued on page 258*]



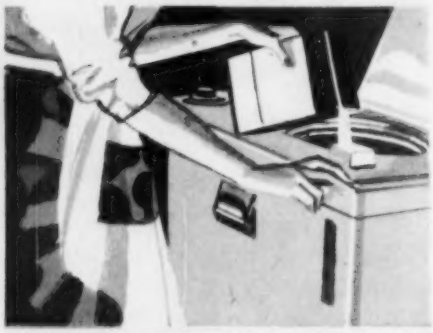
Red and Black F-89s streak color across the snowy bleakness of Arctic outposts. The Air Force slaps red on the planes to make it easier for pilots to see each other while in flight formation. Drop tanks for carrying extra fuel are painted black to reduce glare from the sun and engine exhausts.

Bright Red Tails mark the big helicopters hauling men and supplies for the Air Transport Command in Labrador. Before each flight, hot air run from a portable heater (below right) warms up engines and transmissions of the Work Horses for easy starting, and melts ice off rotor blades.

I'd Like to see them make...

PULL-OUT DRAWBARS under the front and rear bumpers of cars so that a chain could be hitched on without danger of damaging the bumpers or guards.—*M. Carey, New Castle, Pa.*

A TROWEL WITH A GAUGE IN INCHES on the handle so you could measure depth when planting different varieties of bulbs.—*Mrs. E. L. McNaron, Fairfield, Ala.*



A DISPENSER ON A WASHING MACHINE that would hold a whole box of detergent. Pushing a button would measure out the amount needed for a wash.—*Leonard Volinsky, Bronx, N.Y.*

A STAIRWAY LIGHT SWITCH in tread of top and bottom step. Start up or down and light would go on. Foot pressure at opposite end would turn it off.—*Richard Monroe, Columbus, Ohio.*

COLORED PAINT REMOVERS. A light one for dark finishes and a dark one for blond pieces would show up any missed spots on the wood surface.—*C. Launius, Chicago.*

Everyone has his own pet idea of a gadget that he would like to see in general use. The five ideas illustrated above were suggested by POPULAR SCIENCE MONTHLY readers. What is *yours?* We will pay $5 for each one published. Please use Government postcards only. Write name and address clearly. Contributions cannot be acknowledged or returned.

The Navy is trying out tomorrow's air weapons on the

World's Fastest Railroad

OUT on California's barren Mojave Desert, just over the Funeral Mountains from Death Valley, the U. S. Navy now runs the world's fastest railroad.

Its tracks are double-weight rails welded into solid bars 4½ miles long and anchored in concrete. Its engine is a battery of aircraft rockets. Its single freight car is a streamlined steel sled—for this railroad runs much too fast for wheels.

Its cargo: models of tomorrow's supersonic fighter planes.

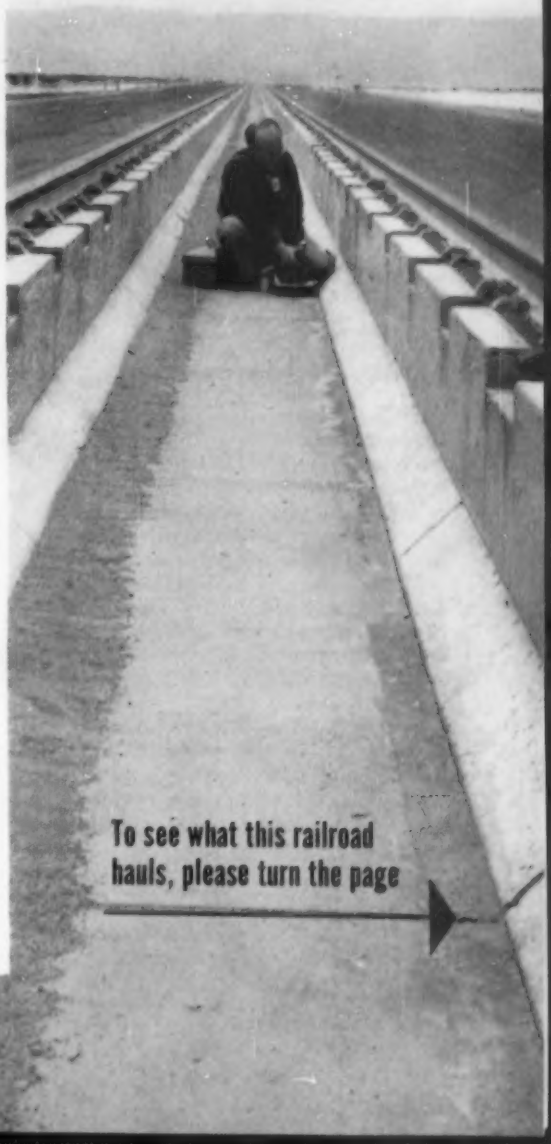
Though they never leave the ground, these planes fire rockets and guided missiles at imaginary targets while highballing down the tracks at speeds that would whisk the Super-Chief from Los Angeles to Chicago in an hour.

SNORT Goes Nowhere—Fast

The rocket railroad starts and ends within the Naval Ordnance Test Station at Inyokern. The Navy calls it SNORT, for Supersonic Naval Ordnance Research Track.

Right now SNORT'S super-smooth straight rails can support a sled traveling at 2,400 miles an hour without twisting or buckling under the terrific loads imposed. Plans are complete for adding a third rail and stretching out the track to 10 miles. Then SNORT will be able to handle speeds eight times that of sound —some 6,000 miles an hour.

The two scientists chiefly concerned with the project—W. D.



To see what this railroad hauls, please turn the page

SNORT tests a rocket in action

Quick-trigger cameras between the rails shoot a running record of a rocket's or guided missile's performance as it is launched from a plane perched on a rocket-powered sled. Accelerating from zero to 1,050 m.p.h. in one second, the speeding sled tests plane designs as well as weapon performance.

Drinkwater and Ray Nelson—consider SNORT the missing link between wind tunnels and free flight.

Tunnels, they point out, require millions of horsepower and cost millions.

"And in free flight," Drinkwater notes, "we run the risk of losing the only model we have. That costs a large sum, and takes time to build another. On the track we control all test conditions."

(Another rocket railroad, in New Mexico, tests what happens to people in sudden stops from high speed. There an Air Force doctor recently set a land speed record for humans of 632 m.p.h.—then was jerked to a halt in 1½ seconds without serious injury.)

Before SNORT was built, the Navy, backed by the Research and Development Board of the Defense Department,

consulted with the Army and Air Force to see how many of their research and testing jobs could be done here. It asked leading universities and many manufacturers this question: "If you had a railroad like this, what would you do with it?" In brief, the answers come down to this program, some projects current, some for the future:

- Guided missiles are shot down the track at high speeds under conditions approximating free flight, and their behavior is studied.
- Airborne guns are fired and rockets launched from planes so that their aeroballistics may be determined. These tests help develop air-to-air weapons our planes need to knock down the enemy.
- Aircraft fire-control systems are tested at supersonic speeds to determine wheth-

RADIO ANTENNAS above rocket sled transmit information to observers during runs. These reports on equipment being tested supplement movies taken by cameras between the rails.

UNDERNEATH SLED a Navy scientist in cowboy boots adjusts scoop that dips into a trough of water to bring the vehicle to a relatively easy stop at the end of its supersonic slide.

er they make the first shot count. In high-speed combat, an interceptor may not get a second chance.

- Rocket fuses are attached to an arm of the sled and rammed into stationary targets. Such testing helps perfect delay mechanisms that permit a warhead to penetrate inside a wing or fuselage before exploding.
- Guns of various calibers are fired into wings and other aircraft parts to find out how good our weapons are against supersonic opponents. Plane parts are smacked into stationary targets to see how well they stand up.

Full-Size Planes to Run the Gantlet

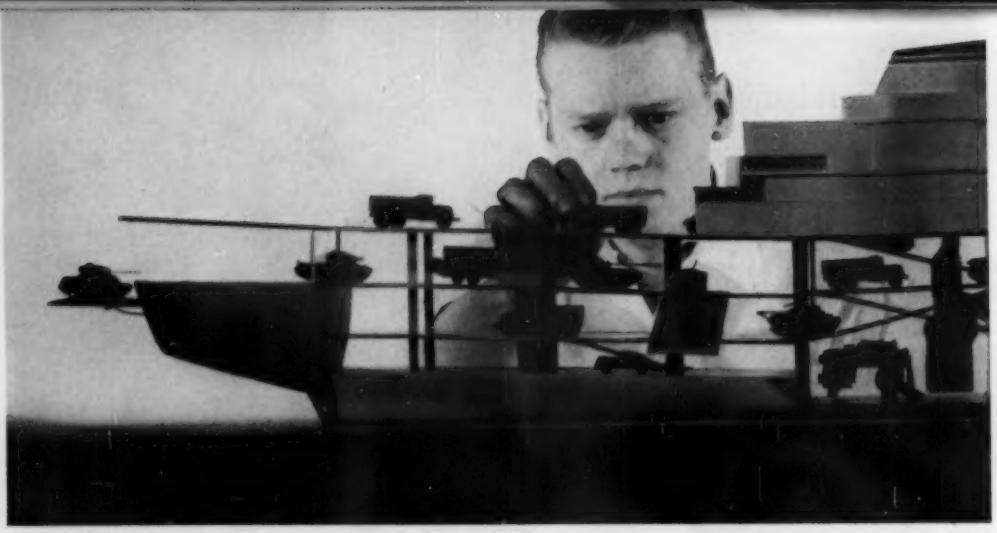
Finally, full-size planes will streak down the rails. The Air Force wants to know what happens to a plane that catches fire while flying faster than the speed of sound. Cockpits will be ejected, escape pods blown out as from a crippled fighter, chutes of several kinds opened at various speeds.

At present, a test assembly can be rocketed up to a speed of 3,500 feet a second and hold that velocity for 2½ seconds —yet have 9,000 feet of rails left to slow down and plunge its fingerlike brake into a trough of water that quickly grinds it to a halt. But in that violent 2½-second interval, scientists grab a bale of vital information for improving America's defenses.—*Andrew R. Boone.*

SPRAY SPEWS OVER DESERT as water brake is applied gradually during last two miles. At high speed, sled actually rides on thin layer of air between rails and shoes that grip track.

Biggest Cowpoke in the West, this aluminum figure is stationed at the Nevada state line to welcome dudes to the wide-open spaces. His waving arms point out a nearby resort—a gambling palace, hotel and restaurant. He weighs nine tons, stands 65 feet tall and cost $30,000.

Army Green is about to bust out all over in Uncle Sam's Army. Next year, officers and GIs alike will wear general duty winter uniforms of a gray green picked for appearance instead of camouflage. Pinks and tans will be worn in summer but the olive drab familiar for over half a century will disappear after 1960.



Seagoing Car Park To Speed Shipment Of Tanks and Trucks

THE multi-story downtown parking garage is going to sea. A new kind of ship will use the vertical-parking-lot idea to transport Army trucks and tanks overseas.

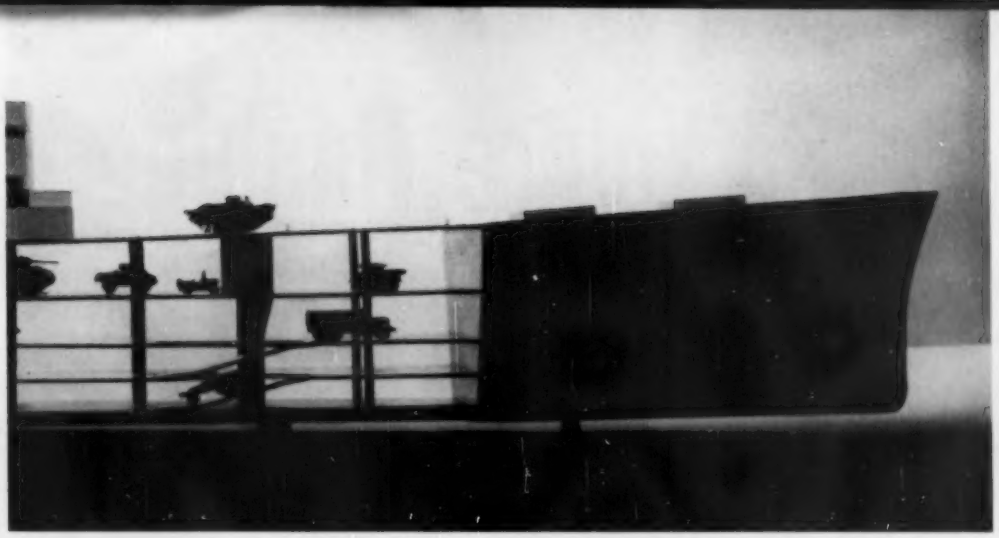
This is the Vehicle Cargo Ship, shown above as a model. Trucks and tanks will simply drive onto it under their own power and park. At their destination they will drive

You Need a Key to Work This TV

THE Germans have come up with a simple cure for kids afflicted with TV-mania. It's a set that won't work until mama sees fit and turns it on with her key. The lock-and-key TV is manufactured by Telefunken GMBH, Mehringbamm 32234, Berlin.

New Tester Beats Up the Road

TO FIND how tough asphalt highways are, a new machine uses eccentrically weighted wheels (on truck in background) to beat the paving. An electronic detector then measures accurately how much this beating jars the surface. Shell Oil developed the device.



off again. Until now vehicles have had to be lifted on and off ships by cargo booms.

Like a city parking garage, the ship will have five levels interconnected by ramps. There will be entrance-exit gangways on the second deck—four on the side and one in the stern. The VCS can carry 4,000 tons of any wheeled equipment – everything from 60-ton tanks and big howitzers to motorcycles and jeeps. It is not a landing craft; it will carry eight times as much as an LST but will have to unload onto a dock or another ship.

Designed by George G. Sharp, Inc., for the Military Sea Transportation Service, the VCS can serve in peacetime as a freighter.

Bike Rims Make Wall Framing

BICYCLE rims for house framing? Dr. Peter Schlumbohm, inventor of the Chemex coffee maker, who thought up the idea, points out that they are light, strong, and easy to put up or take down with bolted clips. Ordinary materials could cover them.

Noise Patrol Nabs Loud Bike

MOTORCYCLES make too much noise, French police have decided. So they are using sound meters in a campaign to track down the worst offenders, like the unlucky guy above who was nabbed riding a bike with a defective exhaust pipe.

So You're Thinking

NEWEST AND SHOWIEST of 1955 crop of station wagons is Chevrolet Nomad, modified from a 1954 "dream car." It has seats for six, slanting pillars, exposed rear wheels.

ROOMIEST WAGON among Big Three—Chevvy, Ford and Plymouth—is Ford's, shown here in Country Squire version. Toting eight passengers, it runs heavily to simulated wood trim.

# of a Station Wagon?

PLYMOUTH'S STATION WAGONS for '55 have rounded sedan lines like this two-door—and include, for the first time, a four-door three-seater.

Then you're right in line with an increasing number of new-car buyers—and here's what you want to know about the '55 models.

By Devon Francis

IF YOU walk in the front door of an automobile store this year intent on a new car, the chances are about one in 15 that you will drive out the service door in a station wagon. In 1940 the odds were only one in 150.

The wagons no longer are the exclusive property of the horsy set. The common people are clamoring for them—by the hundreds of thousands—and for '55, they have a smörgåsbord choice among the vehicles with the big picture windows.

You can get wagons with riding qualities that are almost—but not quite—as good as those in a comparable sedan.

You can get wagons that look as though they had been trimmed inside by Schiaparelli.

You can get wagons in blue and red and green and the pastel shades.

You can get more wagons offering a choice between two or three seats.

And, with the new engines, you can get wagons in the so-called low-price field with high performance.

Ford Holds '54 Wagon Title

Ford, Chevrolet and Plymouth, in that order, sold the bulk of the station wagons in 1954.

For 1955, Ford serves up a mixture of style and utility. It offers a big cargo compartment (but is reluctant to name its cubage). Ford's folding and remov-

able seats and the hinged floor in its three-seat job are almost too tricky. The hardware on its split loading door probably is the best in the industry.

Ford is one of six station-wagon makers, out of a dozen in the U. S. field, who supply an optional two or three seats. Ford also has more interior rattles than its two chief competitors, and its plastic seat covers scorch too readily if flecks of hot tobacco fall on them.

As between utility and good looks, Chevrolet inclines toward the latter. This reflects the preoccupation of the parent corporation, General Motors, with styling. That is not to say that the Chevvy wagon isn't useful. But, in the interest of appearance, it's built almost an inch and a half lower than the Ford. That cuts its cargo capacity.

Its cargo opening is smaller than that of either the Ford or the Plymouth. Chevrolet offers only two seats—on the argument that it's kids mostly who occupy that third seat, and surplus gamins can ride on the cargo-compartment floor.

The Chevvy wagon rattles a bit inside—all wagons do—but the simplicity of its seat hinging for conversion to a cargo carrier is a delight. On the other hand, the suspension on the tailgate and the supports on the transom leave something to be desired.

The Plymouth wagon, with a heavy emphasis on utility through 1954, has been slicked up this year. The company discovered that a boxy appearance was losing sales. Like all Chrysler Corp. products, the Plymouth is substantially made. That includes the tailgate suspension and transom supports. It's quieter than either the Ford or Chevvy. It rides softer because it's shocked better. For the first time, it comes with four doors and an optional third seat.

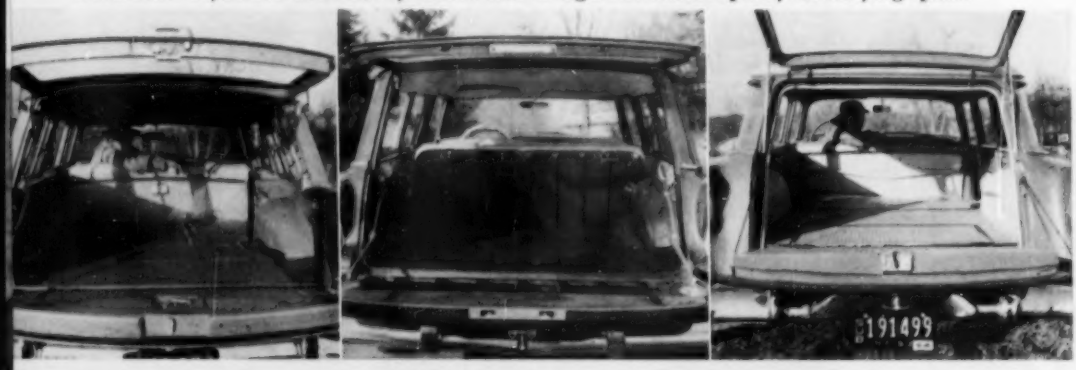
It has less cargo capacity than either the Ford or the Chevrolet, on the basis of statistics figured on the cuff.

The Customers Want Room

Detroit's customer surveys show that people buy station wagons mainly to get a car with more space inside.

There are other advantages to a wag-

Ford beats Plymouth and Chevvy—below left to right—in cubic capacity of carrying space.



Ford also has better transom supports, better tailgate suspension. Plymouth is a close second.

CUBIC-FOOT BOXES—87 of them—illustrate manufacturer's announced capacity of Chevvy station wagon. All of them can't be crammed in—as with every wagon, cubage includes the crannies. Owners haul practically everything, from squalling kids to bawling livestock, in wagons.

Ford's cargo opening is the highest, Plymouth's the widest, and Chevvy's the handsomest.

Driver entrance on all three cars is satisfactory for the average man, but not for six-footers.

of '55 Station Wagons

	PASSENGER SPECIFICATIONS							CARGO COMPARTMENT SPECIFICATIONS							BODY SPECIFICATIONS							
			CUSHION WIDTHS (Inches)		LEG ROOM (Inches)					MAXIMUM DIMENSIONS (Inches)			REAR OPENING (Inches)									
	PASSENGER CAPACITY	NUMBER OF SEATS	FRONT	MIDDLE	BACK	FRONT	MIDDLE	NUMBER OF DOORS	CUBIC FEET	HEIGHT	WIDTH	LENGTH (Tailgate Down)	MAXIMUM HEIGHT	MAXIMUM WIDTH	HEIGHT (Inches)	WIDTH (Inches)	LENGTH (Inches, Tailgate Up)	CURB WEIGHT (Pounds)	DIAMETER OF TURNING CIRCLE (Feet & Inches)	ROAD CLEARANCE (Inches)	TIRE SIZE	MANUFACTURER'S RECOMMENDED PRICE
BUICK[a] ESTATE WAGON	6	2	62.4	–	59.5	35	–	40.8	4	75.3	32.2	56.3	94.4	31.4	49.2	60.6	76	206.7	4,250	44'	8.5	7.60 x 15	$3,450
CHEVROLET[b] BEL AIR V-8	6	2	61.9	–	62.3	43.3	–	43.1	4	87	36.9	58.3	106.1	28.3	43.6	60.8	74	197.1	3,605	41'	6.5	6.70 x 15	$2,655
CHRYSLER[c] NEW YORKER DELUXE	6 or 8	2 or 3	58	60	40.5	44.6	43.5	N.A.	4	84.8	36.8	64.5	122.3	30.5	50	62.2	79.1	218.8	4,585	43' 8"	6.6	8.00 x 15	$4,425
DE SOTO	6	2	58	–	60	44.6	–	43.5	4	84.8	36.8	64.5	122.3	30.5	50	62.1	79.1	218.6	4,240	43' 9"	6.4	7.60 x 15	$3,144
DODGE[d] SIERRA V-8	6 or 8	2 or 3	58	56	45	44.5	43	37	4	83.1	38	64	109.3	33	50.5	60.5	74.5	214.9	3,850	43'	5.6	7.10 x 15	$2,798
FORD[e] COUNTRY SQUIRE V-8	8	3	60.5	60.3	43.8	44.3	39.8	37.4	4	90	37.4	60.5	104.9	35.1	49.9	62.2	75.9	197.6	3,757	41'	8	7.10 x 15	$2,741
MERCURY MONTEREY	8	3	55.3	50.2	46	43.8	40.8	37.4	4	90	37.5	56.3	97.5	32.6	46.3	62.4	76.4	201.8	N.A.	42' 5"	6.2	7.60 x 15	$2,840[f]
PLYMOUTH[g] PLAZA SUBURBAN V-8	6 or 8	2 or 3	58	56	45	44.5	43	37	4	82.1	38	64	103.3	33	50.5	60.4	74.6	208.6	3,675	40' 6"	5.6	6.70 x 15	$2,464
PONTIAC[g] CHIEFTAIN	6 or 8	2 or 3	61.7	42.2	46	42.7	38.8	38.7	4	68	36.7	56.5	111.8	28.7	[illegible].3	61	75.4	202.9	3,841	42' 6"	6.7	7.60 x 15	$2,781
RAMBLER[h] CROSS COUNTRY	6	2	60	–	59.5	44	–	39.5	4	60	35.2	58.5	83	26.7	39.3	60.5	73.5	186.2	2,860	38'	8.1	6.40 x 15	$2,400
STUDEBAKER[i] COMMANDER REGAL	6	2	59.5	–	56.5	42.5	–	41.5	2	65	37.5	55	88.5	21.2	45	61.9	70.7	197.7	3,275[j]	39'	7.1	6.70 x 15	$2,672
WILLYS[k]	5	2	56.7	–	44	43.6	–	38.6	2	100	44.5	58.2	95.7	41	44	74	71.7	176.2	3,399	43' 10"	8.1	7.00 x 15	$2,467

Prices are suggested factory retail prices and include Federal tax, automatic transmission and heater; state or local taxes and transportation or preparation charges are extra. [a] Available in Century and Special lines only; [b] also available in Chevrolet 210, 150 and Nomad; [c] also available in Windsor line; [d] available as two-door in another model and with six-cylinder engine; [e] also available in Ranch Wagon and Country Sedan; [f] Federal tax extra, available in Custom line at $2,692.55; [g] also available as two-seater and two-door; [h] available in smaller, lower priced five-passenger model; [i] also available in Deluxe model in Commander and as Regal or Deluxe in Champion; [j] shipping weight—does not include gas, oil or water; [k] four-wheel drive; also available with two-wheel drive; no automatic transmission available. N.A.: Information not available at press time.

SPLIT MIDDLE SEAT that folds forward, as in most wagons, to form multi-hinged floor is special feature of Ford 8-passenger Country Squire, at left. Hinging on Chevrolet, right, is simpler.

Ford surveys show that three out of four wagons bought are put to full- or part-time family use. Ford and Chevrolet offer five lines of wagons in new models, Plymouth two.

on. It will convert quickly from a passenger vehicle to a cargo carrier. With a mattress, it will sleep two vacationers or fishermen comfortably. Save for the fanciest models with lush upholstery, a wagon can be flushed out with a garden hose. The figures show that wagons have a higher trade-in value than other cars.

Finding out what a wagon will hold is only one of several checkoff points to be considered in buying one.

All are constructed essentially alike these days; all have abandoned the wood trim that inevitably rotted despite applications of wood preservative and shellac. But wagons do differ in dimensions and details.

No Rubber Sides

The cubage of the vehicle's interior affords, at best, only a rough idea of what it will tote. The wheel wells fix the width of the bed, the roof the height, and the distance from the back of the front seat to the end of the tailgate, the length. These dimensions determine what size object can be put aboard.

If you have begun to make sheep's eyes at a wagon, ask questions.

How solidly is the car built? No station wagon has the rigidity of a sedan. A sedan frame is trussed and closed at the ends. A wagon is a box with an open end. In time, transom and gate shake.

Be prepared for a harder ride. Wagons are sprung, and often shocked, harder to take bigger loads.

If you plan to load up with enough lumber to build that extension on the porch, better shell out a little extra money for bigger tires.

Buy an outside mirror too. In many states they are mandatory on wagons, and with a high cargo they are indispensable.

Wagons Stop Slower

Be prepared to pay a higher price for a wagon. Most run several hundred dollars more than a comparable sedan.

With a wagon, learn to drive more cautiously. Brake diameters are no bigger than they are on a passenger car chassis, and it takes longer to bring the heavier wagons to a stop in emergencies.

Wagons are colder than sedans in winter. That's due not only to bigger interiors but also to the radiation of heat through the extra glass area.

The car makers are still conscious of a wagon's snob-appeal among the common folk: Witness Chevrolet's wraparound rear windows and Ford's elaborate, simulated exterior wood trim.

Whatever the reasons, wagon sales are booming. Some 25,000 wagons were sold in the U. S. in 1940. The wise heads in Detroit are predicting 375,000 to 400,000 in 1955—equivalent to the entire output of a factory the size of Buick's. END

Clock Sets Traffic Rules

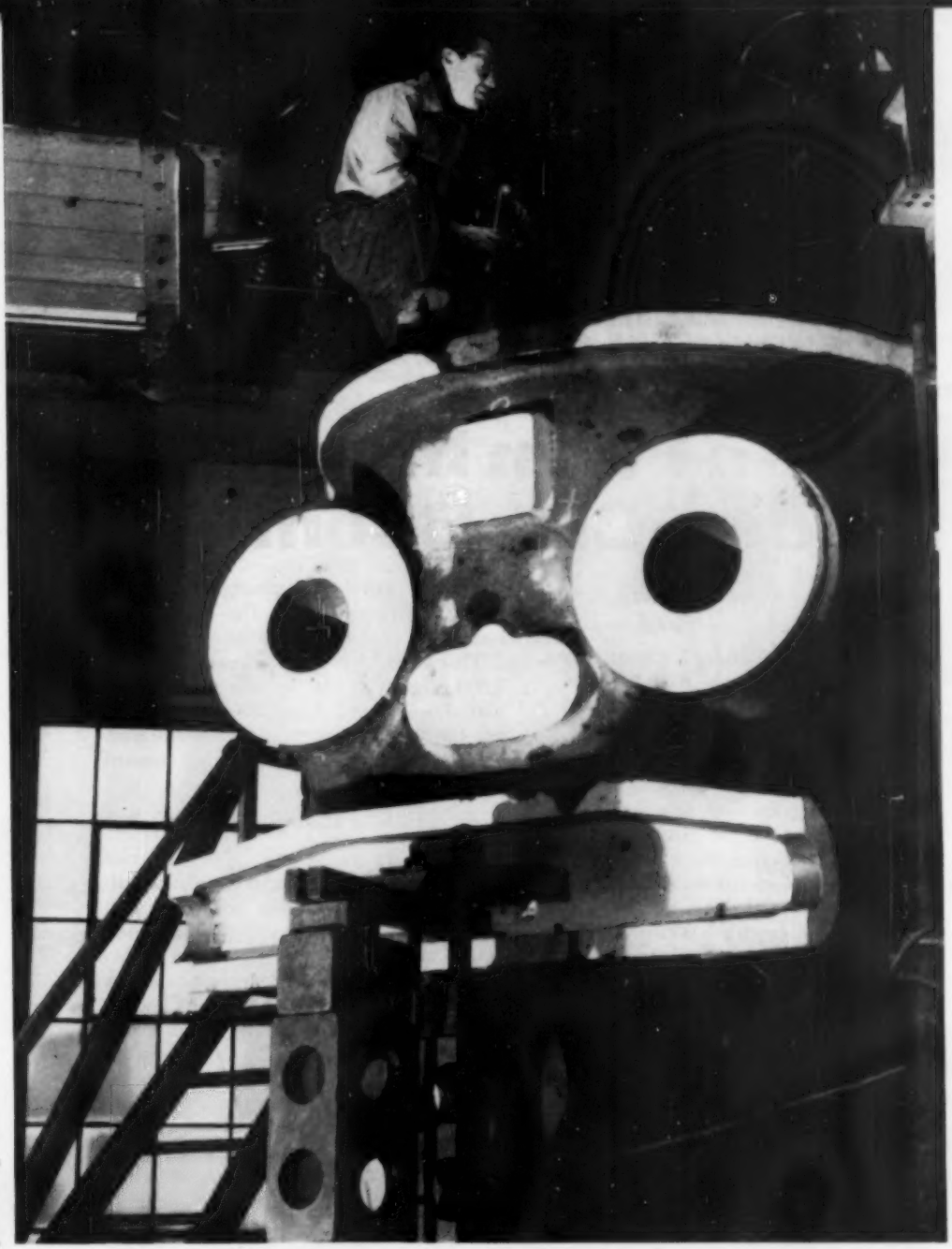
PORTLAND, Ore., is trying out a traffic sign with a clock that changes the rules to match the flow of traffic. It bans left turns at peak hours and lowers a shade carrying a second sign permitting turns when fewer cars are moving. Elwood Wiles Co., Portland, makes the sign.

Once Upon a Time in Mexico . . .

. . . FILEMON SANCHEZ TRUJILLO envied the mayor because he owned the only bicycle in the whole village of Chignahuapan. But one day the youth studied the bike real hard and made himself one of wood. It had springs to soften the seat and a chain to drive the wheels—but no brakes. When the fascinated mayor saw it, he bought it. Now Filemon rides a shiny store bike.

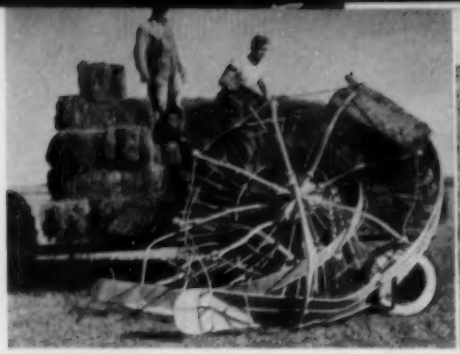
Record Player Shows Moving Music

SPIN a platter on this record player and shifting color patterns change form with each beat of the music. A built-in kaleidoscope synchronizes with electronic impulses from the record. The Picturola is made by Philharmonic for Montgomery Ward.



Great Steel Face Will Gulp Steam to Turn Turbine

THIS is not a giant robot's head but the top half of a turbine shell. The "mouth" will gulp hot steam under pressure to feed the turbine. Steam returned to the boiler for reheating will pour back to the turbine through the eyelike openings. The 60,000-pound shell is being machined on an 18-foot boring mill at a General Electric plant.



FERRIS-WHEEL bale loader, invented by Marvin Preifert, scoops up either square or round hay bales, feeds them handily to trailer platform.

NO PRAYING MANTIS, the "Soileveler" is a hydraulically controlled land plane. Farmers use it to shape fields for irrigation and soil conserva-

These Farm Inventors Made a City Boom

Industries sprout in the heart of the prairie, as farmers put their green thumbs to new uses.

By William S. Dutton
PHOTOS BY W. W. MORRIS

THOSE old plaints about little business not having a chance and machines robbing men of jobs are louder than ever because of automobile and other mergers. Before the gloom gets too thick, let's visit Columbus, Neb.

As World War II drew to a close, the outlook of the town's 8,000 people was as bleak as its prairie winter. Platte County, of which Columbus is the seat and center, was losing population. Family-size farms established by German and Swedish homesteaders were being merged. Machines were doing most of the farm work, and the young folks were leaving. Columbus saw itself becoming a mere signal stop in a vast mechanized corn patch.

Signal *tower* describes Columbus better today.

Young men, faced with carving futures elsewhere, have devised more than 100 improvements for use on the robots that elbowed them off the farms. Out of this paradox have grown 11 new factories employing upward of 1,000 persons. Some half-dozen small plants have moved in. Total payrolls from the burgeoning industries exceed $3,000,000 yearly.

This added wealth has created another 1,200 jobs in stores, service stations, repair shops. Retail sales in Columbus are five times what they were before the war. The population is now pressing toward 11,000.

Construction Up—Tax Rate Down

Seventy-six blocks of new streets, four schools and 869 homes have been built. More streets have been paved in five years than in the preceding 50. Pawnee Park on the edge of town now has night-lighted football and baseball fields, a swimming pool, bath houses, picnic areas. In spite of all this the tax rate has been halved.

Columbus was much like any rural county seat until about 1945: a headquarters for lawyers, doctors and county officers. Prairie farms, the town's reason for being, rolled out on every side as far as the eye could see. When the war ended, sons in uniform came home to find that, because of growing farm mechanization, there were few farm jobs, that other employers were laying off help, not taking on.

A group of town leaders—Phil Hockenberger, E. H. Lohr, Ed Nielson, C. E.

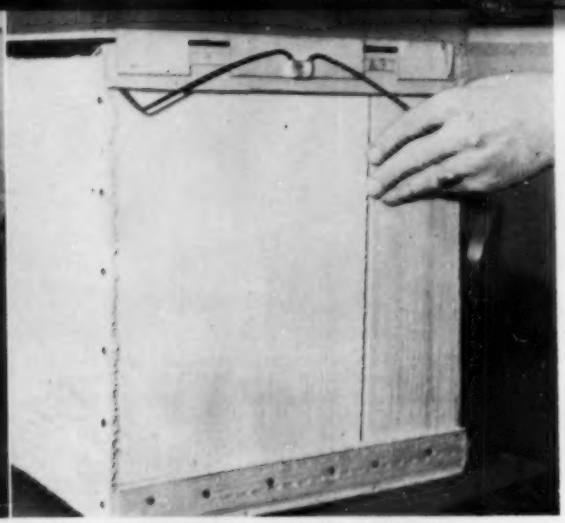
tion. Highly successful company that builds it was founded by Allen Hanner, a young ex-Marine, in partnership with mother and sister.

THAT LUMP on tractor steering shaft is a power-steering accessory unit that Behlen Mfg. Co. makes. Mike Behlen is the pleased pilot here.

WILD HAY catches unwild arrows in the archery targets made by Charles Saunders, above right. He invented and patented special machines to twist the Indian corn grass, plentiful in Platte County, into targets that have been used in 26 of the last 30 big archery tournaments.

SITTING PRETTY, in upholstered and hydraulically shocked comfort, is Ivan Schmid, co-owner of Fleischer-Schmid Corp., which has sold many thousand tractor seats.

CORN HOOK shown on Walt Behlen's hand was a failure, made obsolescent by mechanical corn pickers. But it taught the brothers a lesson.



LID CLAMP for egg case, a reliable spring-wire clip, was Walt Behlen's first success. He quit his job and became a full-time manufacturer.

Pearse, Ray Reed, J. O. Peck and a few others—met to take a hard look at what was ailing. The diagnosis was that machines had changed the face of the Midwest, yet Columbus was hitched to the horse age.

"We said some unkind things about Washington," Phil Hockenberger told me, "but we came to an inescapable conclusion. Towns are what their people make them. The responsibility for our future was our own."

Factories Displace Weeds

The men formed a corporation, Industries, Inc., and an abandoned Government tract was bought and laid out in small factory sites served by electric power, natural gas and a railroad siding.

"We set out to do what towns in our fix usually do, try to bring outside industries in," said Mr. Hockenberger. "Yet our first applicant for a site was young Walter Behlen, who had grown up right here on a Platte County farm."

Walt, Gilbert and Mike Behlen, and their father, Fred, no doubt would be tilling their own small farms today if machines and mergers had not shoved them off the land. That was before the war. Walt drove an express truck for $25 a week; Gib worked in the express office; Mike was still in school.

"None of us ever got to college," Walt relates. "We knew no trade. Our only assets were that like most farm-bred boys we had good strong backs and were handy with tools."

When a chance popped up to buy a little business for $600, Walt, his brothers and father each put $25 into a down payment and signed notes for the rest. Their new shop was fitted with tools and dies for making corn hooks. Farmers had used such hooks for generations in hand-husking corn from the shock.

Machine Age Kills His Hook

Not until they began trying to sell hooks did they find that *they* had been hooked. Harvesters that picked the corn and husked it in one mechanical operation had already invaded the corn belt. In two years the hand-husker was out of date.

Walt took over the notes and was five years paying them off. But he still had the shop and in his mind had formed a resolve: whatever he undertook to make was going to be *ahead* of what others made. And as soon as it wasn't he wouldn't give it shop space. He began looking at things with a new eye, the eye of an inventor.

As an expressman Walter handled many cases of eggs in shipment. The lid

WIRE-MESH TUBE for drying corn in crib, and later, all-mesh crib itself, were important inventions that changed farming practices.

DRYING TOWER for shelled corn and small grain has own heat source and blower, uses tractor for power. The Behlens build it in many forms.

clamps could be better, Walt concluded. Nights in his garage or summer evenings under an apple tree where he had a forge, he experimented with a better clamp. It wasn't long before he had one. An Omaha advertising man talked him into investing $15 a month for advertising in a poultry journal. In 1940 he sold all the clamps he could make and had enough orders ahead to quit his job on the express truck. Then he took his father in as a partner. They called themselves the Behlen Manufacturing Co.

Mesh Tubes Solved a Problem

Now on sure ground, Walt took up a major problem of the Midwest corn grower. Fall rains often prevented feed corn from drying sufficiently in the field, which caused it to mold later in the old wooden corn cribs. For years farmers have needed a cheap, dependable method of crib-drying. Walt hit on a simple scheme. He rolled strips of mesh wire into tubes. Placed among the mass of ears in the crib, the tubes became air ducts or ventilators. He built a motor-driven blower to force dry air through the wire ducts at will.

Tests proved the scheme so effective that corn could be harvested before the rains or as quickly as it matured. Overnight the tiny Behlen Company was leading a small revolution in harvesting practices. Soon the Behlens and others adapted the idea to the bin-drying of wheat, rye, oats, barley and shelled corn. The idea of all-metal storage bins, which may be air-sealed after the grain is dried, was their next step, and such bins are standard in the Midwest today.

The Tube Stands Up—and Gets a Roof

Walt's one-man shop had grown into a booming venture in several rented downtown buildings when he applied to Industries, Inc., for a factory site in 1946. His two brothers had joined the partnership the year before. He was employing some 20 men, and in addition to his crib ventilators and dryers was producing the first all-mesh, frameless corn crib. This was simply a huge mesh tube stood on end and put under a roof. When they borrowed $140,000 from the RFC, built a factory of glass and steel, paid off the loan in no time, the whole town talked.

Then an idea epidemic hit Columbus.

Walter Schmid, nearby farmer, was bothered by a sore back. "It's time somebody built a tractor seat that doesn't ride like a bucking steer," he told his cousin, Ivan Schmid, and his brother-in-law, Leonard Fleischer.

They went to work. The result: a tractor seat fitted with a hydraulic shock

absorber and adaptable to any farm tractor. Later a universal joint was built into the seat to iron out the lurches on rough ground. In 1947 the Fleischer-Schmid Corp. sold 25,000 tractor seats, and their new factory with air-conditioned pine-paneled offices rose near the new Behlen works.

A Stiff Neck Launches Business

A sore neck started the Kosch Manufacturing Co. At supper one evening, Howard, one of Farmer Kosch's seven grown sons, complained that his neck hurt from looking backward all day at the cutter bar on the field-grass mower.

"There's no sense in having that bar behind the tractor wheel," he said. "It ought to be in front like it was on our old horse-drawn mower."

"That's a good idea," nodded Farmer Kosch, an old homesteader. "Why not do something about it, like Walt Behlen?"

Howard, Max and Joe Kosch, late of the Army and Navy and now surplus hands on a mechanized farm, soon had a shop where they were turning out ten frontal cutter bars daily.

Allen Hanner, a 20-year-old ex-Marine, took a homemade soil mover that had been used in scooping out irrigation ditches, added some ideas of his own, and in partnership with his mother and sister organized the Soil Mover Co.; before long he was making 50 of his ditchers a month.

Carl Siefken, former Richland farmer, opened a shop for making his idea of a better corn blower, an attachment that cleans the ears of bits of husk and silk as they are mechanically picked, husked—and now shelled, too—right in the field.

All these ventures have adopted the basic Behlen policy: never again to be caught behind the times. Or as Ray Arndt, who is busy making hay loaders, puts it: "By keeping a jump ahead of the big fellows, we make sure that nobody is going to trample us underfoot."

At the Behlen plant—now grown to 225 employees—they will show you a mesh-welding machine, used in making metal corn cribs, that cost less than a tenth of the best price quoted by a big machine builder. The mesh-welder was built from scratch by boys off the farms.

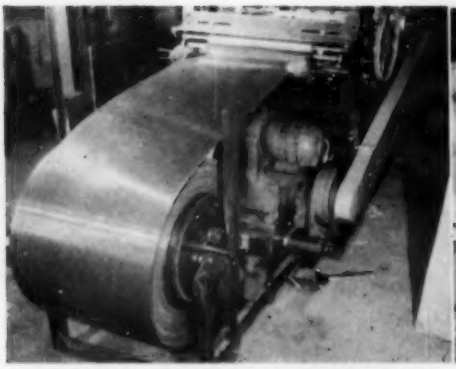
Harold Kramer was spark plug in Columbus

A LIVE WIRE in area's development as an industrial community was this native son. Originally a coal dealer, he worked to develop a local hydroelectric plant (below), became its general manager, and tried unceasingly to further new industries. One of the founding fathers of Columbus's new form, Harold Kramer died in 1949.

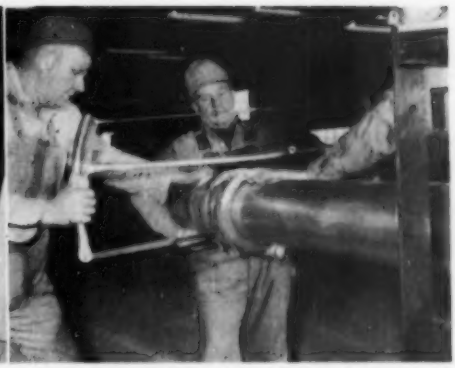
Since the lesson of the corn hooks, the Behlens have introduced 19 other improvements in farm equipment, most of which have been successful. Of the ideas hatched in casual talks around Walt's desk after work, the biggest, made public in 1949, is still a cause of wonder wherever it is seen.

Explaining its inception, Walt took a sheet of letter paper and stood it on edge on the desk-top. The sheet promptly fell down. Then he folded it into a pleated or accordion effect. This time when he stood it on edge the sheet stayed upright. On that principle he built the first commercially feasible frameless building, made wholly of aluminum sheets.

Townspeople invited to view the building were flabbergasted. The interior was 50 by 200 feet, and not a supporting pillar or girder or partition was in sight, just empty space. Walt swung 14 big tractors from the ridgepole to prove that he had calculated every stress and strain. However, not until a full-scale storm hit



COBBLED TOGETHER in the shop, this tubing mill for aluminum irrigation pipe cost Arndt brothers far less than a commercial mill would.



OVER FOUR MILES A DAY of welded aluminum tubing can come off the mill. Arndts succeeded in field where many fabricators had failed.

They made what the experts couldn't

LIGHT AND STRONG, as brothers Ray and Ed Arndt show above, the welded pipe is fine for irrigation systems. Pipe does not take on a permanent set on uneven land and can be easily relocated. Arndts started with hay loaders assembled from surplus parts, and managed to sell 30 of them in a single week.

the area were all folks convinced. One of the frameless buildings was being erected when the storm struck. Its most exposed end was open and unfinished. Yet the building withstood the full force of the 80-mile wind without damage.

Since then, 125 of the frameless buildings have been erected in more than a dozen states. They are being used as factories, warehouses, barns, churches, and at Wood River, Neb., for a public school. The largest, 100 by 552 feet, is a warehouse at the Union Stockyards at Omaha.

So confident has Columbus become

[*Continued on page 294*]

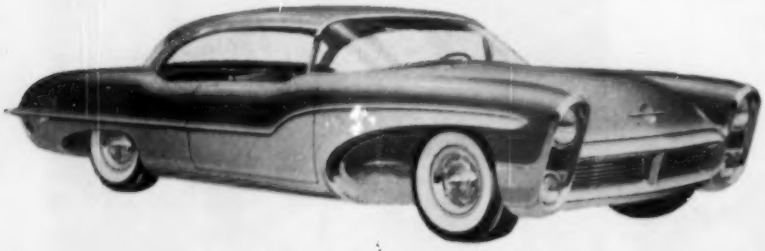
Cars You Can't Touch

Stylists hold annual wish-car parade. And some features may not be very far from reality.

THE automobile engine that everybody talks about, but nobody this side of Lancia builds except in a laboratory—the V-6—is on display this year among a spanking new batch of never-never cars. The cars are show jobs, the kind you can't buy.

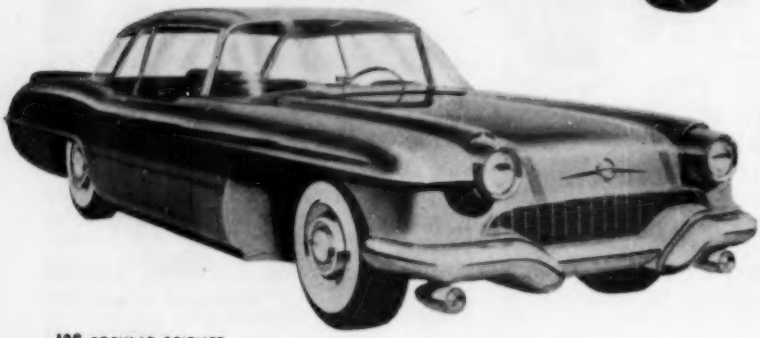
For its 1955 Motorama, GM has hand-fashioned V-6s for two cars. With fuel injection instead of carburetion, each develops 150 horsepower.

The experimental cars are pure adventures in styling. You can't buy or drive them. In fact, Motorama visitors have been asked not even to touch them.



OLDS' DREAM: Air scoops to help cool the front brakes are included in two oval-shaped fender tips on car at left. Ovals also house head lamps and parking lights. A hardtop, car is powered by experimental 250-hp. engine. Its wheelbase is 120 inches.

BUICK'S ENTRY, third version of its Wildcat in as many years, is only convertible in show. Hood slopes forward. Parking, directional lights are housed in bumper bombs. Air intakes help cool brakes. Engine, of 280 horsepower, has 9:1 compression.



PONTIAC is given a sports-car look by exaggerating length of front-wheel cutouts. Scoops over head lamps supply fresh air to passenger compartment. Interior is finished in vermilion and brushed aluminum. Four-carb engine has 250 horsepower.

LASALLE II SEDAN is one of two cars with V-6 power. Second one is LaSalle II sports coupe. Each engine has overhead camshaft. Car's floor, body sills, engine supports and body shell are built integrally. Car, named for GM's original 1927 LaSalle, has wheelbase of only 108 inches.

CHEVROLET four-door hardtop has head lamps snugged between fenders that house parking lights. Tinted windshield extension curves back over driver's head. Concave sheet metal eliminates normal rear-fender contours. Car has V-8 high-compression engine developing 215 hp.

CADILLAC is four-door hardtop with 280 horsepower. Center posts are gone. Front seats pivot outward for easy entrance. Knickknack pocket is built between two front seats. Rear-view mirror is atop panel. Car height is only 54½ inches; wheelbase is 124 inches.

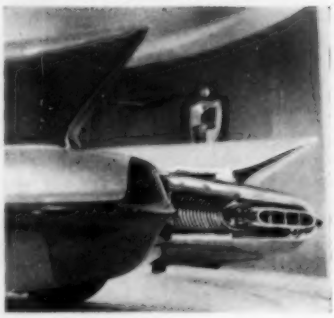
Souped to 300, New Chrysler Regains Horsepower Title

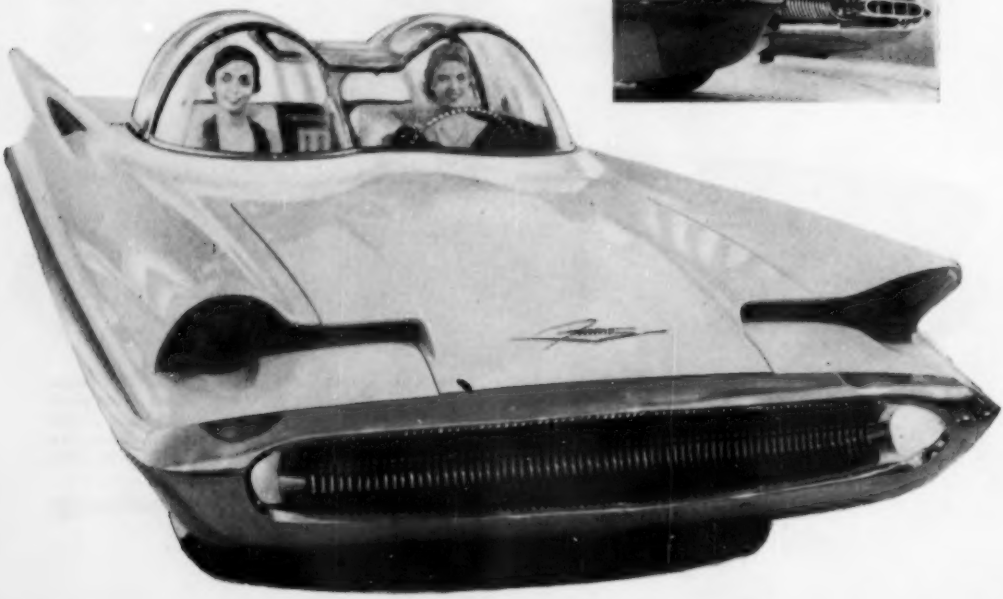
TAKE Chrysler's most muscular V-8, hot it up with a high-performance camshaft, solid valve lifters and two four-barrel carburetors. Install it in one of the company's smallest chassis-body combinations, which has itself been modified to lower the center of gravity and stiffen the suspension. That'll give you the new Chrysler 300, currently the highest-powered stock car in the U.S.

Its juiced-up engine with 8.5:1 compression puts out 300 hp. at 5,200 r.p.m. Power brakes, dual exhausts and an automatic transmission are standard, with a choice of 3.36 or 3.54 rear axles. Heavy-duty shock absorbers help it hold the road. The speedometer is calibrated to 150 m.p.h.

Passengers Get Separate Domes in Double-Bubble Lincoln

LINCOLN calls this experimental car the "Futura" but plenty of goldfish could call it home. Most novel of the year's dream crop so far, its double-dome canopy is linked with the door: open the door and the hatch rears back; close the door and the dome comes down. A transmission interlock keeps you from driving with your lid flipped. Gill-like slits feed air into the windowless vehicle. Out back a microphone picks up and amplifies outside sounds.





How to avoid

Burned-Out Bearings in Your Shoulders

Going at household chores the right way can save you the sudden strains that bring on painful bursitis.

IN A small Eastern suburb not long ago an advertising man was painting his house. For a few hours he got along fine. But he was not used to painting, and his arm got tired and then sore. Still he kept on, thinking the soreness would go away.

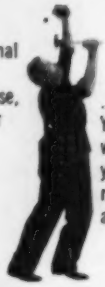
That was Mistake No. 1.

He tried some lower trim first, to get used

You can do your household chores the right way

HAMMERING

Hammering at normal waist or shoulder level is good exercise, helps keep shoulder in trim, but . . .



. . . look out for this. You can get away with it when you're young, but it's rough on shoulders after 35 . . .

. . . and so is cross-hammering.

HEAVY LIFTING

Make your forearms help support load.

PAINTING

How to invite bursitis pain. Let younger men do overhead jobs . . .

. . . or switch to small brush, rest often, support elbow with hand.

There goes that arm-stretch again. Shoulder joint is taking full load!

Better: move ladder oftener and paint close-in.

SAWING

Up-and-down sawing can strain tendons if you're over 35 . . .

And look out for this! He may have bursitis tomorrow.

Sawing at waist, or sawhorse, level, spares excessive strain . . . and so does power-sawing.

SHOVELING

Don't make your shoulders throw heavy snow loads unless you're young . . .

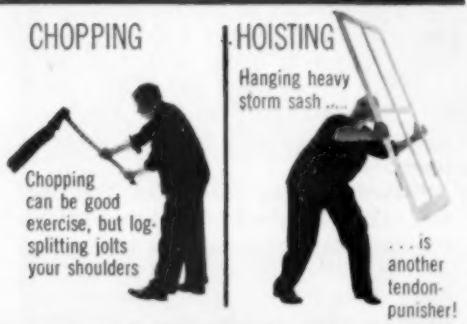
Use smaller shovel, let wrists, forearms, toss snow aside lightly.

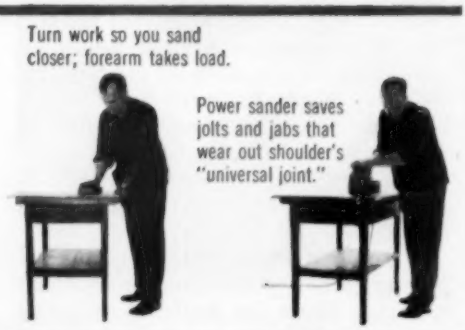
After you're 35, a motor plow will spare not only your shoulders but your heart.

SANDING

How to wear a shoulder out fast: sanding at arm's length.

—or the bursitis way





to the ladder. After two evenings he screwed up his courage and went right up to the big eaves.

That was Mistake No. 2.

He had been painting the eaves over his head for 30 minutes when the sudden pain hit. It was as if he'd been stabbed in the shoulder. The joint made little snapping sounds.

Twenty-four hours later the pain was agonizing. "It digs into my shoulder," he told the physician, "and runs down my arm. My shoulder seems to be locking, and I can't lift my arm."

The doctor nodded. He knew the story.

On the increase. Bursitis is hitting an ever larger number of men who have office jobs, then plunge into heavy physical work. This man had overstrained his shoulder by suddenly loading on it a heavy painting job. He'd given himself the finishing touch by painting over his head—without rest.

"I've heard a lot about bursitis, Doc," he said. "What is it, anyway?"

The doctor thought for a moment.

"You can compare it to a burned-out bearing, in a way," he said. "Your shoulder—where bursitis often hits—is a wonderful universal joint. If you had to swing a baseball bat all day long you'd get tired. But that's exactly what your shoulder does. Your arm is a heavy stick of beef—and your shoulder hoists it thousands of times a day with practically no leverage to help.

"Surrounding that shoulder are several little fluid-filled sacs called bursas. We think they're the bearings your shoulder moves on. Bursitis is an inflammation of one of these bearings. Sometimes we get a gritty debris in them—from wear and tear. It's just like sand in your automobile bearings."

The ad man frowned.

"There are dozens of bursas in your

CARPENTRY AND CHORES help exercise your shoulder through its full range daily. This, doctors say, will keep it from ever being frozen into immobility, as some disused shoulders are. Chart shows, however, how to avoid tendon tears that help bring on bursitis. After you pass 30 to 35, never strain your shoulder when your arm is outstretched.

body joints," the physician added. "You can get bursitis in any of them—but 'wear-and-tear bursitis' usually hits our overworked shoulders."

"Can I be cured?" the ad man asked. "Will I be able to go on working around my house? I need that recreation."

"We're careful about the word 'cured,'" said the doctor. "But I'll say yes to both questions. You can go on working—if you use a little judgment. And your acute type of bursitis *is* curable. In fact, we know now that nature will usually cure an attack in three days to a week—with or without treatment."

How strain does it. In the same town a few days later a man was throwing a baseball to his son.

"Here's a long, high one," he called, and put his shoulder's full force behind it. As it plunked into the boy's glove the father's shoulder pained for a moment. Later that day he put several boards—roofing for a new carport—across two low nail kegs and handsawed them to length. His sore shoulder began to hurt sharply.

LADDER CLIMBING may benefit shoulder bursitis. Mild armwork helps loosen adhesions which try to "freeze" the shoulder.

That night he lost sleep. Next day he was in terrible pain.

"My shoulder's been sore for months, off and on," he told the doctor. "But it's never hurt like *this*."

"You've torn a tendon," the doctor said, "but that isn't what's hurting you." He then told about the two common kinds of bursitis associated with tendon wear and tear.

"One is *acute* bursitis," he said. "The other is intermittent, or *chronic*. You seem to have been suffering from the latter for a year or so. However, your strenuous armwork yesterday now has brought on an acute attack."

Then the doctor explained:

"You see, what happens is this: Your tendons are like ropes, or pulley belts, that connect your muscles to your arm bones. One of these main tendons runs past the principal bursa in your shoulder.

"As you grow older this tendon, like any rope, shows normal wear and tear. You can make this wear and tear worse by unaccustomed exercise. Then debris from the little tears begins to collect—inside the tendon. Often it gathers in spots damaged when you were younger.

"Calcium salts now form in the debris, and soon you've got a tight little knot of pasty substance in your shoulder.

"Now, through tiny tears in the tendon, this pasty stuff begins to leak into the smooth-running bursa. Just a little gets through—but suddenly the bursa's inflamed. You feel pain. It may go away, then reappear from time to time.

"That," said the doctor, "is *chronic* bursitis.

"But sometimes you rip a much bigger tear in your overworked tendon—and the whole gritty knot pushes through to the surface. It becomes an abscess pressing into the bursa. Suddenly there's great pain, and you can't move your arm. That's what happened to you. But don't worry—the pain will go away within a few days."

Guarding your shoulders. You may live to be a hundred without ever having trouble with your tendons or bursas. But your chances are a lot better if you don't damage those tendons before you reach 40.

Your wife should know about bursitis, too. For women get bursitis even more often than men. Sometimes the mere exertion of lifting a wet sheet over a clothesline can cause bursitis to strike a woman with sudden pain.

Here are the rules doctors suggest to reduce your chances of tangling with bursitis or torn tendons:

If you are under 40: If you are still in your early twenties, you have nothing to worry about for several years yet—

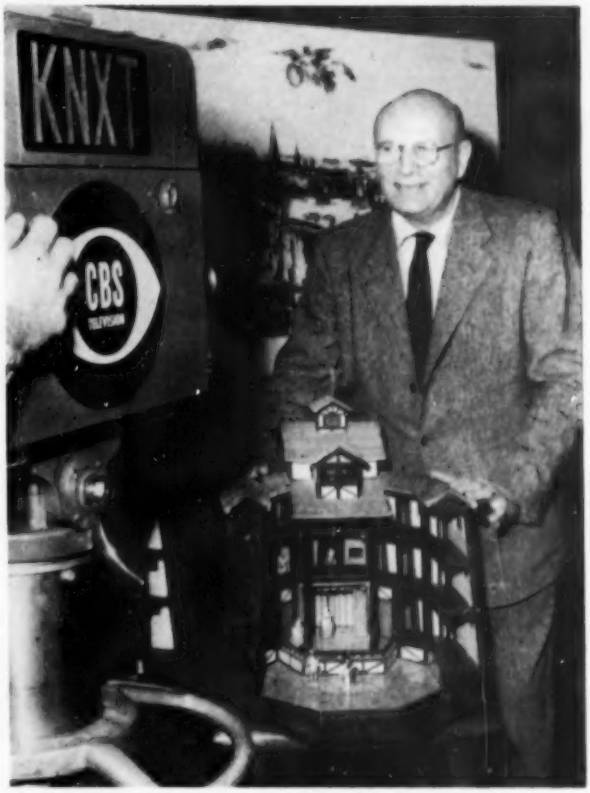
[*Continued on page 254*]

TV Prof Makes His Own Props

PERHAPS the most popular professor in the U.S. is one who gives TV lectures on world literature and builds his own props for them in a bedroom in South Pasadena, Calif.

"People want to see something more than a man and a book," says Dr. Frank C. Baxter, 58-year-old professor of English at the University of Southern California, whose weekly program, "Now and Then," is carried by a total of 95 stations.

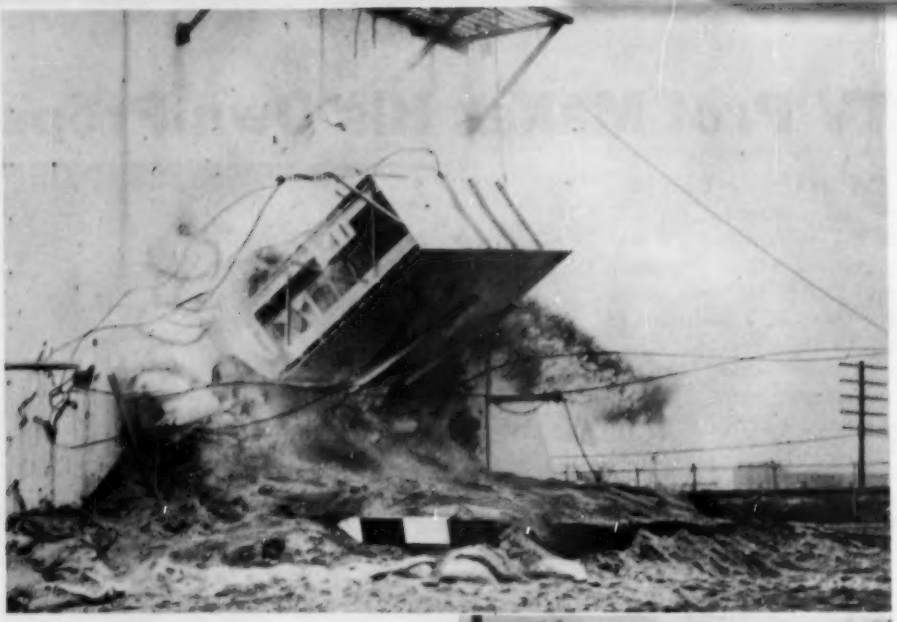
So, on a two-foot-square work table, he has built a miniature of Shakespeare's Globe Theater, created stage settings and scenes, and carved more than 300 toy actors to help enliven his subject. He even constructed a tiny working model of one of the earliest printing presses and turned out copies of seventeenth-century playbills on the little machine.



GLOBE THEATER is a nine-pound model, 22 inches high, that Prof. Baxter built of plywood, raffia thatch and dowels.

PROGRAMS for Shakespeare's plays, as the professor performs them, are printed on this model he built of one of the world's first presses.

CREATING ACTORS for his shows, Prof. Baxter here is reworking the faces and forms of dime-store lead figures with a ¼-inch carving tool.



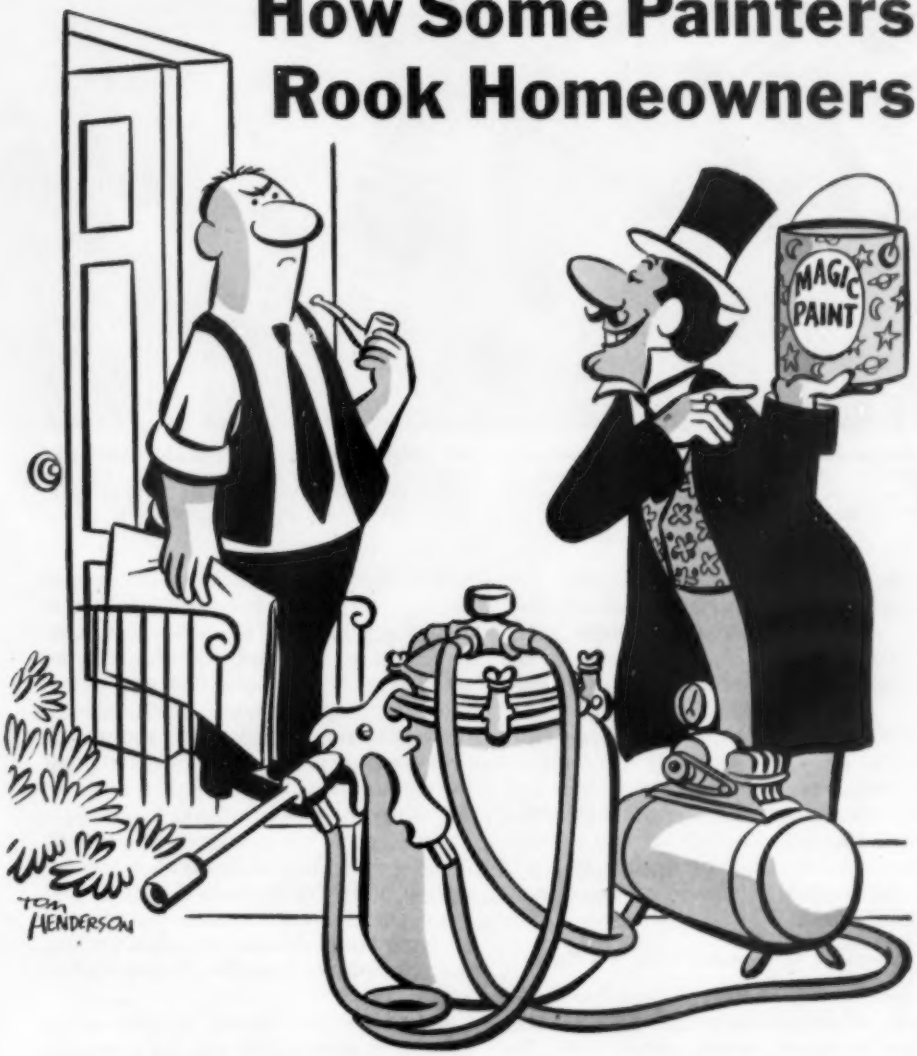
Crash Won't Puncture New Fuel Tank for Airplanes

WHEN a plane crashes, the fuel tank often busts open. But a new kind of tank may cut down this fire hazard. A rubberized nylon bladder set in a wing section, it was catapulted into a wall at 70 miles an hour. When inspected by experts from the Civil Aeronautics Authority, Goodyear and U.S. Rubber (right), the water-filled tank hadn't even sprung a leak.

Four Jets Zoom Big Seaplane To 600 M.P.H.

THIS is the Martin SeaMaster, world's first multi-jet seaplane. Powered by four Allison turbojets—you can see air intakes for two of them atop the wing—it will zoom off on minelaying and photo-recon missions at more than 600 m.p.h. The big swept-wing flying boat has a long, narrow hull ending in a T-shaped tail that towers as high as a three-story building.

How Some Painters Rook Homeowners



Beware the "miracle coating" salesman. His slick-talk racket costs the American public over $5,000,000 a year.

By John L. Springer

THE salesman's promises sounded marvelous to the struggling young homeowner. Here was a new "miracle coating" that would end his outside painting for a long, long time.

Sprayed over the warped old wood shingles of his house in St. Albans, N.Y., it would give a brilliant new stain- and vermin-proof finish. And it was guaranteed against chipping, cracking and peeling for 10 years.

Moreover, the salesman promised, the

Four homeowners paid up to

SPRAYED ON CONCRETE BLOCKS, right over old plaster, "miracle coating" came loose in splotches that POPULAR SCIENCE reporter could peel off by sliding his hand under them.

ON WOOD SHINGLES plastic paint quickly discolored, and the stain ran down over the foundation. The contractor's "10-year guarantee" turned out to be only slick talk.

house would be used as a "model." The owner would receive $25 for every other job obtained in his neighborhood.

Thankful for his good luck, the homeowner went to the bank, borrowed $650 and signed the sales contract without bothering to read the hundreds of words in fine print.

The job was done three days later and looked excellent. But within two months the finish began to rub off like powder when anyone brushed against it. Parts of the coating, originally cream-colored, turned black.

Contractor Is Smoother Than His Paint

Nine frantic phone calls and five weeks later, workmen came to repair the job. They sprayed more paint over the cracked, peeling walls and handed the homeowner's wife a piece of paper to sign "just to show the boss that the work was done."

Soon the cracks and stains were worse than ever. When the homeowner phoned again, the contractor told him angrily that the job had been completed satisfactorily—and he had a signed release to prove it.

For the first time, the customer read his contract. Nowhere could he find mention of a guarantee. The seller had merely agreed to "register the job for a period of 10 years." The paper that was signed after the "repairs" were made released the contractor from all future claims.

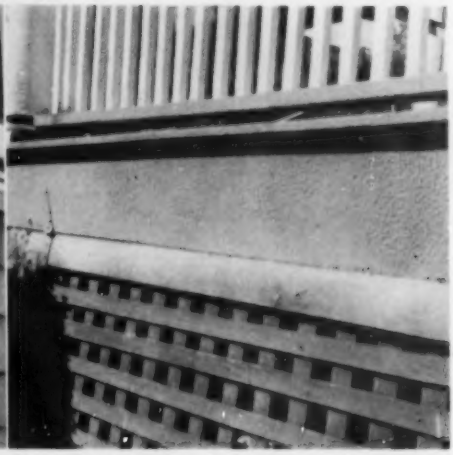
Thousands of homeowners throughout the country have been swindled in a similar way by unscrupulous, fly-by-night "mastic paint" contractors. Victor H. Nyberg, president of the National Association of Better Business Bureaus, says this paint racket is the most prevalent of all home-improvement swindles, costing the public more than five million dollars a year.

In most cases, these "lifetime" paint promoters use trickily worded contracts that give the buyer no legal protection when the job turns sour. Their salesmen talk of "guarantees" but actually they give none. Better Business Bureaus have received thousands of complaints, but the BBB lacks legal power to compel an adjustment. And since these sharp operators promise almost nothing in writing, the police usually are powerless to act.

Your best protection is knowledge of

$2,800 for "permanent" paint jobs that soon looked like this

SPRAY-GUN-HAPPY painters plastered TV lead to side of this house in their haste to cover everything. It stuck—but paint peeled off the siding in great, spreading scars.



NOT BOTHERING to mask off the trim, mastic spray crew splattered part of trellis under this porch and left the rest unpainted. Window frames got same hit-or-miss treatment.

a few basic facts about these plastic paint contractors:

• Mastic paints, in themselves, have value. Some, when properly applied to the surface for which they are designed, will give good, long-wearing satisfaction. John C. Moore, technical director of the National Paint, Varnish and Lacquer Association, trade organization of the paint industry, says mastic preparation often can be sprayed effectively on concrete block or porous brick if the surface has been cleaned properly and if the paint contains no linseed, soybean or other drying oil.

The thickness of the paint on masonry closes small cracks, preventing the entrance of moisture, and also withstands mild settling movements of the foundation.

Most abuses of these paints have involved their application to wood or asbestos siding. "No mastic paint we now know of adheres properly to a wood surface," Mr. Moore tells homeowners.

• Despite what many fly-by-night operators claim, there is nothing mysterious about the composition of mastic paints. Almost all are made with an acrylic or plastic resin base, but a few contain an oil base. To this are added coloring pigments and large amounts of asbestos fiber, perlite, vermiculite, or other inert matter which give the consistency of a paste.

The mastic is usually applied with a special, high-pressure outfit like the type used to spray stucco. A film from 1/16 to ¼ inch can be built up in this way, although usually it is about 10 to 20 mils in thickness. This is about two to four times the thickness of the usual coat of house paint. Experienced paint men know, however, that the chances of good paint performance on wood decrease rapidly as the thickness increases beyond about five-thousandths of an inch. Modern exterior paints are designed

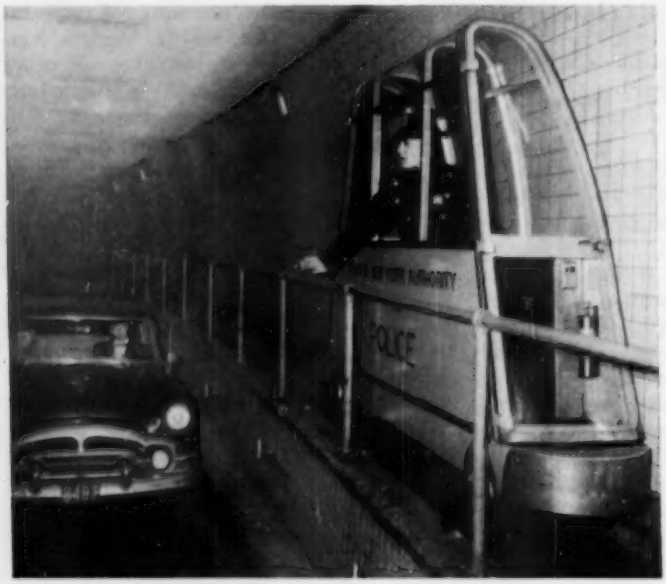
[Continued on page 268]

HINT TO AN UNHANDY HANDY MAN

Successful inventions
Don't spring from intentions.
If you think you'd like inventing
Then start experimenting!
—Hugh Linzback

Robot Camera Snaps Photo of Speeder's License Plate

WHEN a speeder passes the Foto-Patrol car parked beside the road, above, he leaves behind a photograph of his car's license number. Upon crossing two ribbons laid on the road as at right, a car automatically sets off a stroboscopic flash lamp and trips a 35-mm. camera's shutter if it is exceeding the speed limit. Otherwise, nothing happens. The apparatus is the invention of Leon Pearle of New York.

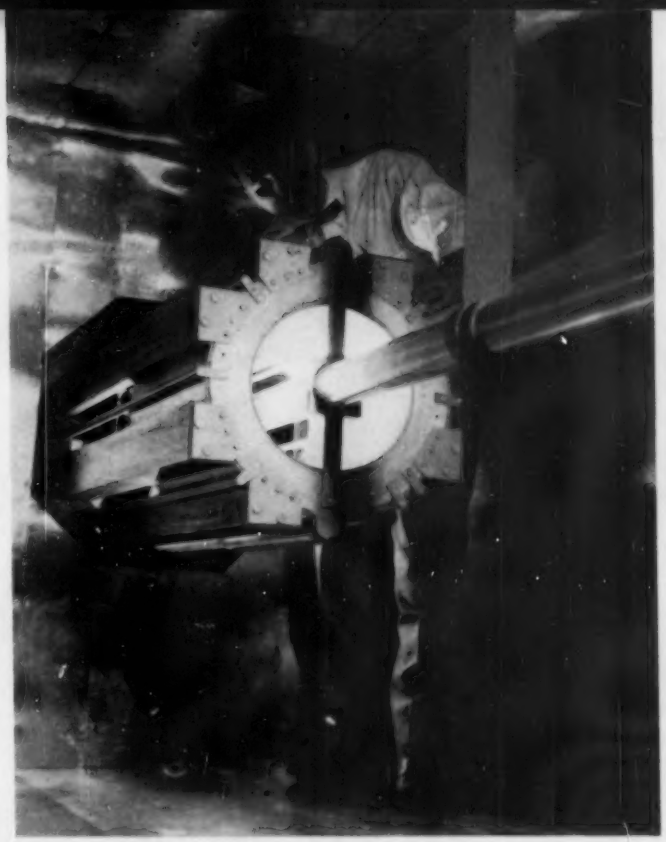


Car on Catwalk Helps Police to Patrol Tunnel

RIDING a "catwalk car" that hugs a wall of the Holland Tunnel between New York and New Jersey, the tunnel policeman at left can travel faster and farther than afoot, supervising traffic and assisting motorists. If successful in this trial, the two-foot-wide electric cars on miniature railroad track will be installed in each tube of the twin-tube Holland and Lincoln Tunnels.

Atomic Piles Go on Market to Aid in Research

Now you can buy and run an atomic pile—and if you want one for industrial or educational use, a graphite-uranium model for sale by General Electric may be just the thing. The picture shows its core, where it hurls neutrons against test specimens within the horizontal tube at its center. This low-power research reactor burns solid-fuel "slugs" enriched in uranium 235. Its price: $125,000 to $175,000, depending on auxiliary equipment. Recent revision of Federal law eases obtaining fuel from the Atomic Energy Commission.

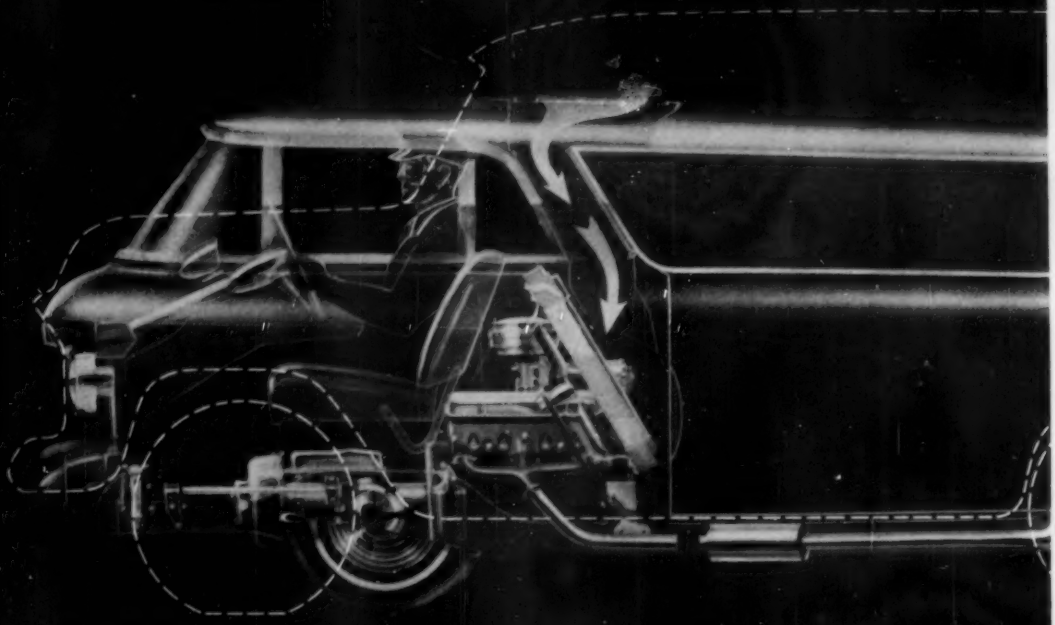


Huge Artificial Cave Is Turned into Frozen-Food Warehouse

HEWN from solid rock in a limestone quarry, this underground cavern at Turner, Kan., has now become the world's biggest subterranean deep freezer. Used to store frozen foods, the seven-acre grotto is maintained at a temperature of 10 degrees below zero by three miles of pipes circulating brine refrigerant.

General Motors forecasts

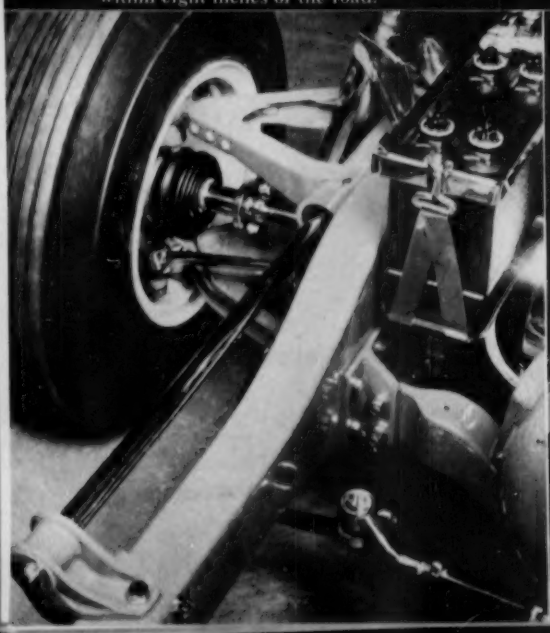
New Trend in

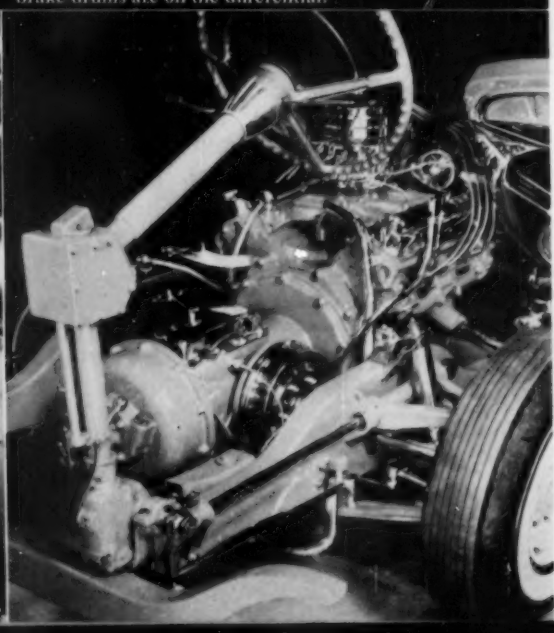


Here's how the dream truck compares with a 1955 model

TORSION-BAR SPRINGS in front, long leaf springs in the rear, and lack of a main drive shaft made it possible to lower the bottom of the body to within eight inches of the road.

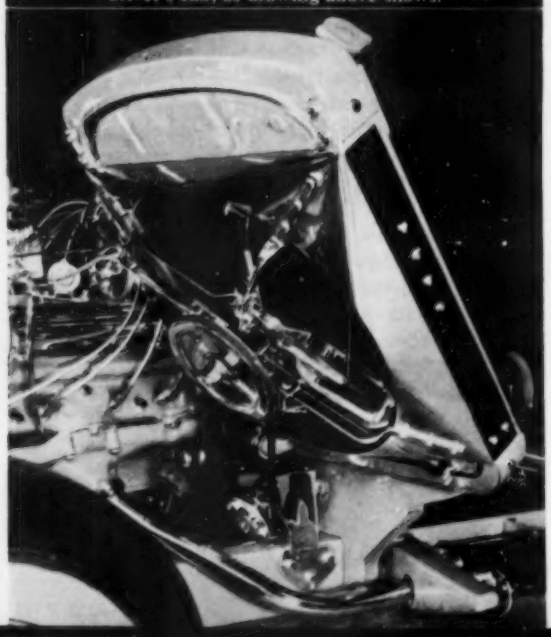
BUS-TYPE STEERING ASSEMBLY enables the driver to ride way forward and see more. He sits over the front axle and ahead of the engine. Note that brake drums are on the differential.





Trucks

SLANTED RADIATOR AND FAN are tilted to get deeper breaths of air from two ducts that have their joint intake in roof behind the driver's cab, as drawing above shows.



The future panel truck, if the public likes this sample, will be short, low, yet carry more.

By Wesley S. Griswold

THERE is a mite of a half-ton panel truck now touring the U.S. that makes a 1955 model look as clumsy and overgrown as a 14-year-old in second grade.

The precocious newcomer is on display in General Motors' family road show, the annual Motorama.

"It's short and low, and carries a whale of a load—that's the whole story," said one of the men most intimately involved in creating this novel truck. He thinks that it may lead to drastic changes in the looks of the vast fleet of automotive vehicles that totes the nation's packages and peddles its groceries.

But the little truck is much more than a dandified delivery car. Punch out a panel on each side of the body behind the driver, install windows there, put in two seats, and you have a taxi, a station wagon or a small bus. Remove the seats, lay an air mattress on the floor, and you have a natty sportsman's car.

To the Opera in a Pickup Truck?

One GM designer even dreams of another variation on the basic chassis—a pickup truck so smart in appearance that your wife would be happy to share the driver's seat with you.

The new GM truck's wheelbase is eight inches shorter than that of a conventional half-ton panel truck, and its over-all length is nearly 10 inches less. This should make it unusually nimble in traffic.

It is as low as most new passenger cars. A man five feet 10 inches tall can easily see over the top of it.

Its loading floor is twice as close to the ground as any ordinary delivery truck's—only 13 inches above the pavement, or less than the height of an average step above the normal curb. Nobody need strain his back to fill it.

Yet little and low as it is, the truck has

TRICK DOORS double up as they rise to wide-open position, demonstrated on a rough working model.

a load capacity of 173 cubic feet. That's 14 cubic feet more than the capacity of a standard half-ton panel truck.

It loads through three broad doors, at the sides and rear. The doors lift instead of opening outward, and they jackknife in the middle as they rise. At their farthest extension, they never stick out more than 20 inches from the side of the truck. In the fully up position, they not only are completely out of the loaders' way but even provide a small protection against rain or snow. With all three doors open, the little truck is as easy to fill and to empty as a chest of drawers.

The ideas that have been built into GM's futuristic truck were generated principally in the minds of two unorthodox vice-presidents: Philip J. Monaghan, head of the GM Truck & Coach Division, and Harley J. Earl, the corporation's styling chief.

Monaghan, a tall, broad-shouldered, quiet-spoken ex-football star who, at 40, is the youngest GM vice-president, has long felt that trucks are neglected members of the automotive family.

"See how enormously the passenger car has changed in the past 10 years," he remarked recently. "The truck, on the other hand, looks pretty much the same as ever.

"And think what the truck means to America," he continued, an edge of enthusiasm sharpening his ordinarily mild tone. "Why, if all the trucks in the country should suddenly stop running, people would soon start dying. We couldn't even get a piece of bread! There's hardly a thing we consume or use or wear that doesn't at some time ride on a truck before it gets to us."

Since the truck is such a vital vehicle, Monaghan has been eager to make it handsome, too—something a man can be proud to drive or own.

Designers Go to Work

He mentioned this not long ago to Harley Earl, a man who for years has been mainly responsible for the looks of a fat share of all the passenger cars on the road. Earl abruptly caught fire with the idea. A crack team of engineers and designers was soon at work carrying out Monaghan's and Earl's basic concepts of what a truly modern truck should be.

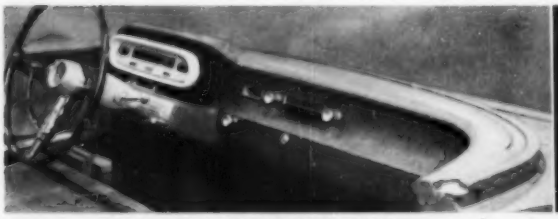
The result is the chic, spunky youngster now on tour. It has many fancy, passenger-car touches that you wouldn't expect to find on a truck.

Its little, 15-inch wheels wear the smallest tires in production (8.00 by 13), beautified with narrow white walls. Though dainty looking, they have a rated load capacity of 1,050 pounds per tire.

The panoramic windshield is more impressive than any passenger car's, for there is no hood in front of it. The designers managed to slant the prow of the truck enough, however, to avoid that snub-nosed, flat-faced look common to buses.

The truck is also unusual in that it has torsion-bar springs (in front only), long a feature of foreign-built cars and just

Smart styling neatly disguises the fact that the little truck is soundly designed for work.



"FLOATING" INSTRUMENT CLUSTER stands out from a concave, copper-plated dash panel. Wide compartment in the center of the dash contains phone set for two-way radio communication.

TAXI, BUS OR STATION-WAGON version of the GM show truck would look like this. Windows would replace metal side panels and the rear would contain two facing three-passenger seats.

now entering the American passenger-car field (PSM, Feb. '55, p. 154).

The styling of its front and rear lights, hub caps and anodized-aluminum body trim is comparable to the best passenger-car standards.

Three Is Not a Crowd

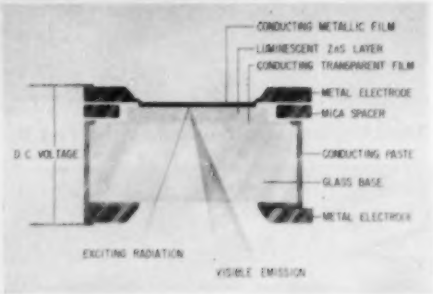
Its split-back driver's seat, very easily accommodating three people, is of Cadillac width and comfort. Another feature derived from the Cadillac is the truck's spacious tread—62 inches from the center of the left wheels to the center of the right ones—which gives the vehicle great stability.

The truck has front-wheel drive and is so balanced that, empty or full, the front wheels carry the major part of the load. Thus the vehicle will always pull its packages around corners instead of pushing them.

The show truck's Hydra-Matic transmission is mounted backwards. There are short, separate drive shafts (as in the famed De Dion rear end) to the front wheels, with constant-velocity universal joints on both sides of the differential. The front brakes are mounted on these shafts instead of on the wheels.

The new GM truck is now equipped with a 180-horsepower V-8 engine, of 288-cu.-in. displacement. If it makes a big enough hit to justify being put into production, that power plant would make it a mighty lively actor on the road. END

TEN TIMES AS MUCH LIGHT comes out as goes in this light amplifier (octagonal cell above). It does not change light into electricity, but has luminescent coating (see diagram, right) that glows brighter when voltage is applied.



New Light Amplifier May Put TV on Your Wall

A SOLID hunk of coated glass amplifies light directly by a new method. If you project a dim picture onto it and apply an electrical voltage, it makes the image brighter. The higher the voltage, the brighter the image.

Presumably it could be used for picture-on-the-wall television, with a projection tube throwing an image onto the amplifying screen, which could make the image as bright as desired. Other uses for photography, X rays and devices that "see" in the dark are also foreseen.

The light amplifier, a General Electric development, was made by D. A. Cusano following theoretical studies by Dr. F. E. Williams. Using a new type of phosphor applied as a continuous film, it operates without vacuum tubes, but needs both light and electrical voltage to work.

The Editors of Popular Science Monthly take this means of recording their profound sorrow at the death on December 10, 1954, of Robert Cade Wilson. He was our friend and associate for many years.

Popular Science Monthly is today the fulfillment of Mr. Wilson's dream. He served for 40 years as a vice-president and director of Popular Science Publishing Co. But even more precious than the business acumen which he contributed to the company's success was the inspirational quality of his leadership, and the great faith that he imparted to all of us who had the high privilege of being associated with him. He was a man of great vision, whom we and all of his other associates are the richer for having known.

There's Cash in Falling Stardust

If you find a rocky missile from outer space, act quickly! You and science may benefit.

By Bentley Chase

ONE spring day in 1948, a 14-year-old Kansas lad, Ralph DeWester, dug to the bottom of what looked like a gopher hole and unearthed a 131-pound chunk of matter that had recently arrived from outer space.

Only a few weeks earlier, it had been part of a larger chunk that had blazed in across the Midwestern night sky, explosively shedding fragments on Nebraska and Kansas as it fell.

This rock hurled from space was an important scientific find. And it brought important money to young Ralph. The University of New Mexico bought the fragment, paying enough for Ralph to take his whole family to California.

Many amateur meteorite-watchers—prospectors, picnickers, sheepherders, hikers, airplane pilots, farmers, housewives, schoolboys—are already in the habit of notifying the University of New Mexico whenever they see a fireball plunge to earth. Some of them have found this very profitable.

Dr. Lincoln LaPaz, director of the

METEORITE'S FLAMING PATH to earth was accidentally recorded on this photo, made at Prague Observatory, Czechoslovakia, on Sept. 12, 1923. The camera was aimed at the great spiral nebula in Andromeda when the intruder shot by. This print is from the American Museum of Natural History collection.

"SHOOTING-STAR SQUAD" at University of New Mexico's Institute of Meteoritics lines up before sunset to film possible fireball tracks and measure any meteorite's angle of fall.

ELECTRONIC HELP for hunters of buried meteorites often comes from converted land-mine locators, like the one above. The walkie-talkie keeps the rest of the search party in touch.

ENORMOUSLY HEAVY for its size, this meteorite, which fell near the Kansas-Nebraska line in 1948, weighed over a ton. Its discoverers had to borrow a crane truck to haul it away.

university's celebrated Institute of Meteoritics, is willing to examine free any sample of suspected meteorite—preferably no larger than an egg—that is sent to him postpaid. If laboratory tests prove that it is the genuine article, the university will usually pay from one dollar to five dollars a pound for the complete meteorite—and they are mighty heavy.

The New Mexico scientists, though, are not the only ones interested in encouraging the public to join in the hunt for meteorites, which Dr. LaPaz calls "one of the most fascinating of scientific sports." Military scientists would like you to get into the game, too, and for a very practical reason.

Meteorites May Help Space Fliers

To the physicist and the ballistician, a meteorite hurtling downward at a hundred times the speed of sound is much the same as a guided missile going up. Its speed and trajectory, the effects upon it of high temperature and cosmic radiation, the crater it makes when it lands—all are data of great value. They are also facts that must be known before the first space flier can venture beyond the stratosphere.

The sooner a meteorite can be examined after it falls, the more science can learn from it. So scientists welcome as large and scattered a group of interested non-professional observers as possible. They are a guarantee of prompt action when a fireball flashes to earth.

Few people, of course, are lucky enough to see a meteorite land and then be able to recover it themselves. However, only three months ago an Alabama housewife almost accomplished this incredible feat.

Mrs. Ann Hodges was taking a noontime snooze one bright December day when a fireball shot across the Gulf States and exploded violently over her little town. A nine-pound hunk of the meteorite tore through the roof of the Hodges house, pierced a corner of the living-room ceiling and nicked Mrs. Hodges' hip. Her only injury was a bruise, and within a short time she was

These lulus were found before anybody was buying meteorites

The biggest meteorite ever recovered from its landing place is the celebrated Ahnighito, at right, which was found by Eskimos in Greenland and brought to the U.S. by Peary in 1897. It weighs 36½ tons and now rests in New York's Hayden Planetarium. Below is the Planetarium's Willamette meteorite, which was found in Oregon's Willamette Valley. It is almost as large as the Ahnighito, but nowhere near as heavy (15½ tons). Its burned-out look probably is due to ages of oxidation on earth, not to the fires of friction created by its fall.

able to be photographed holding the interstellar missile in her hands.

In a few hours, an Air Force helicopter landed in the local schoolyard and its crew whisked the meteorite fragment off to Wright-Patterson Air Base, Dayton, for tests. A colonel assured the Hodges that their rock would be returned to them when its secrets had been probed.

The usefulness of amateur sky-watchers is well demonstrated in the story of how the meteorite was found that flared into view over Nebraska early in the evening of Feb. 18, 1948.

The search began when officers of the New Mexico wing of the Civil Air Patrol, checking reports that an airplane had just fallen in flames near the Nebraska-Kansas line, guessed that a brilliant, exploding fireball had actually started the rumors. They notified Dr. LaPaz at the Institute of Meteoritics.

All night long, LaPaz and his staff combed the distant area by telephone as eyewitness reports continued to come in over the CAP radio network. The scientists coordinated data and with the aid of spherical trigonometry soon had plotted across the map a dotted line ending in an oval about four by eight miles in size. This was the so-called "strewn field" where the fireball must have dropped fragments from its final explosion.

Deep snow covered the fields, but a search party visited the scene between blizzards, checked earlier reports with surveyor's transits and agreed that the main mass must be somewhere in the

Pieces of a planet fell on Arizona

ABOUT 50,000 YEARS AGO, a mighty fireball hit Arizona. The instant of impact, as imagined by a Hayden Planetarium artist, is shown at left.

At right is a TWA air view of the "strewn field" imprinted forever by a barrage of fragments, possibly from the same bursting meteorite.

north end of the oval, either in Norton County, Kansas, or in adjoining Furnas County, Nebraska.

When the snow began to melt, a local man, Bill Tansill, a neighbor of one of the two dozen amateur observers whose calculations helped lead the scientists to their goal, picked up the first tangible clue—a "strange stone" that smelled of sulfur and had metallic specks on it.

Dr. LaPaz promptly identified this as an achondrite, a stony, lighter-than-usual type of meteorite with relatively little iron and nickel in its make-up. Obviously, he said, it had come from some planetary body's outer shell or land area rather than from its nickel-iron core. It was a rare prize indeed.

Off went the first recovered fragment to the University of Chicago's Institute for Nuclear Studies, and Dr. LaPaz began a door-to-door tour of the area, questioning residents for more clues and rekindling their enthusiasm for the hunt.

Days passed and then young Ralph DeWester made his find—the largest fragment of the achondrite yet located.

"Soon," Dr. LaPaz recalls, "you could scarcely look in any direction without seeing a farmer plodding slowly across his fields, scrutinizing the ground at his feet."

Two months later, while plowing, O. E. Gill felt his tractor suddenly lurch and nearly capsize into an unsuspected pit. There, at the bottom of a 10-foot crater, the parent meteorite was found. It was crusted with flint-hard dried mud but it showed characteristic spotty black dents, like thumb marks, on much of its mottled surface.

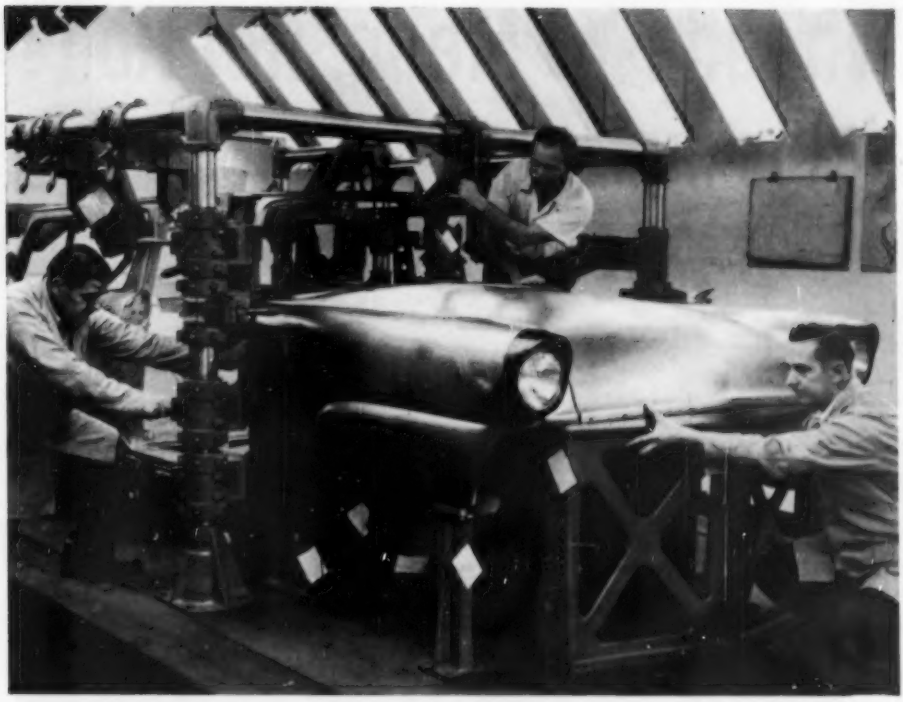
Crumbly Crust Takes Fussy Handling

Cooperating Nebraska scientists helped the New Mexico party excavate the 2,300-pound giant, whose crumbly crust of fused minerals made it almost as delicate to handle as a French pastry. It was then loaded aboard a truck for the long ride to the Institute of Meteoritics.

Meteorites are of two general types—irons and stones. The irons are so exceedingly dense that anyone who picks one up, or *tries* to pick one up, will at once realize that he holds something most unusual. The stones are harder to recognize than the irons. But any unusually heavy rock, which upon grinding on a carborundum wheel shows a dull interior bespangled with shining metallic specks, may well be a stony meteorite—especially if it is coated with a thin, varnishlike brown or black crust.

If you choose to go gunning for photographs of falling meteorites instead of hunting for them after they have landed, you may snap a picture of real scientific value. The best time is after midnight on any clear night, though you may catch

[*Continued on page 260*]



Giant Gauge Helps Workers Tailor Cars with Perfect Fit

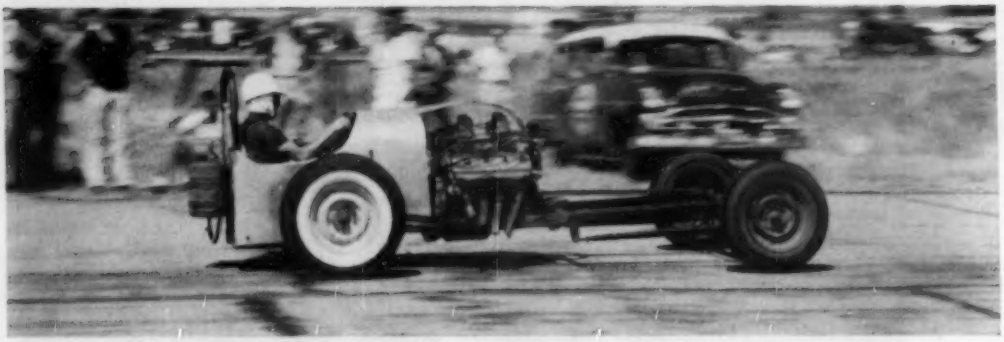
WHEN an automobile worker starts covering the bare bones of a car with its sheet-metal skin, he knows he'll get a perfect fit. Giant gauges like the one shown here measure body contours at the Ford stamping plant, and frequent checks at scores of spots insure that sizes will be exact when parts are dropped in place. Fenders, hoods, doors and windshields get the treatment before they leave for the assembly lines.

Park Gets Its Face Lifted to Make Space to Park 900 Cars

BY ELEVATING a tiny park, San Franciscans gained parking space for 900 cars. St. Mary's Plaza (left) now forms part of the roof of an underground garage that spreads out under adjoining land where buildings were torn down. The raised plaza (right) has been sown with grass and laid with walks. Even a statue was reset in its old spot.

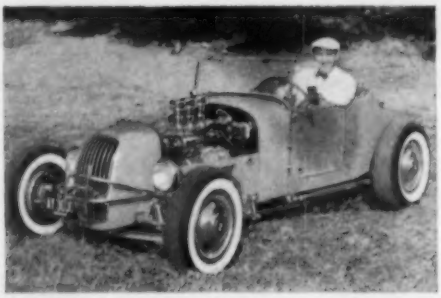
Whadda Ya Mean, Hot Rod?

It's anything from a snazzy sportster to a two-mill monster, so long as its home-hewn shape packs plenty of performance.

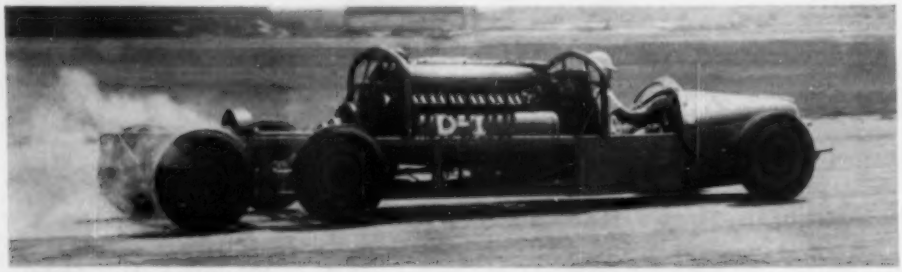


CHRYSLER V-8 engine is mounted well aft on frame from a Model T Ford to give this sprinter heavy rear-wheel traction for fast starts. Before each run, builder-driver Melvin Heath of Rush Springs, Okla., hand-pumps gasoline from aircraft hydraulic tank behind the seat.

RANGER AIRCRAFT ENGINE in this one, driven by Bob Frock of Akron, Ohio, has only six cylinders but a whopping 411-cu.-in. displacement. Shelf over the engine is a protective hood.



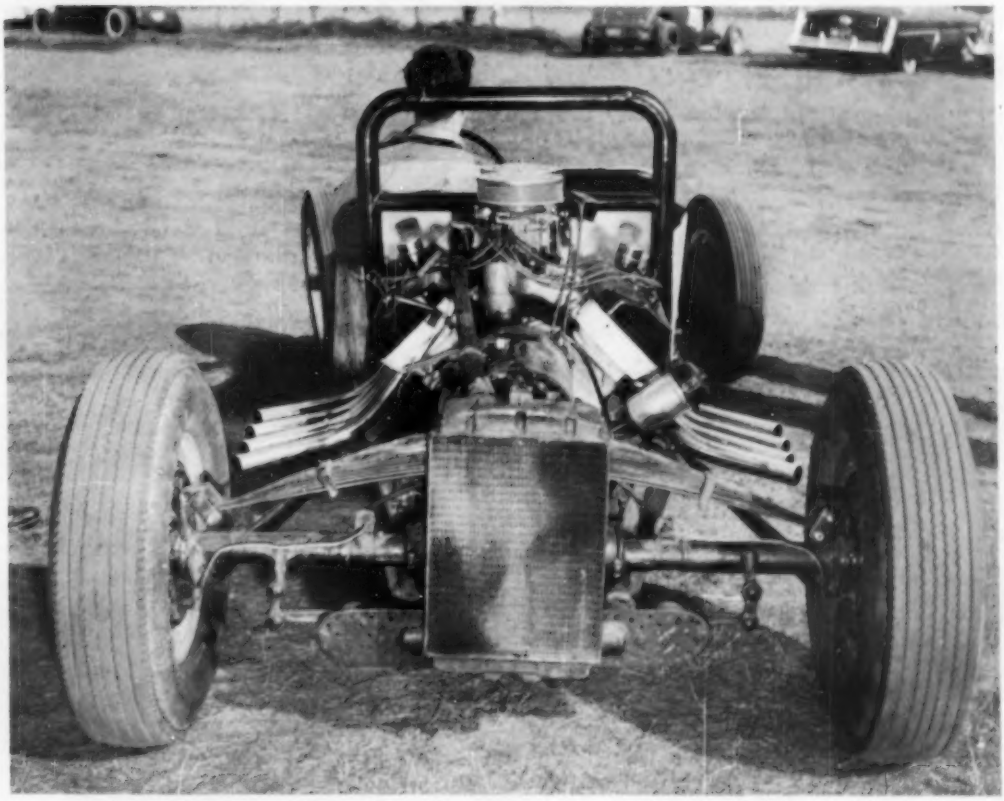
DRESSED-UP DRAGSTER is also driven to work by Bill Robertson of Indianapolis. Three carbs feed the tuned '50 Ford engine. Burning a special blend of fuel, it has hit 149 m.p.h.



"GREEN MONSTER," built by brothers Arthur and Walter Arfons of Akron, is powered by a huge 12-cylinder, 1,710-cu.-in. Allison aircraft engine. Two Ford rear ends drive the four back wheels through a chain-and-sprocket arrangement. The car has done 145 in a quarter-mile.

On an airstrip at Caddo Mills, Tex., two "conventional" dragsters take off for a fast 440.

A HOT ROD, as these pictures prove, is what you make it. The present examples turned up recently on drag strips from Texas to Ohio. They were among the most ingenious designs discovered by touring officials of the National Hot Rod Association. With a trailer full of timing equipment, NHRA men staged a series of regional drag meets—those quarter-mile sprints in which the payoff goes to acceleration rather than sustained high speed. Purpose of the safari was to promote interest in off-the-road racing, under standardized rules and strict safety regulations, among America's young back-yard automotive engineers.



IT'S GOING, NOT COMING. Even the radiator helps hold down the rear of Duane DePuy's and Joe Scarpelli's "Cleveland Clipper." Though car weighs only 1,470 lb., its Chrysler V-8 has been souped to 340 hp.—a weight-power ratio four times as hot as Buick Century's.

New Aids to Living...

1 The postman can't miss and visitors unfamiliar with your neighborhood will find you even at night if you mark the mailbox with Scotchlite. Two strips lettered in blue cost $2.

2 Wanna build an organ? Here's a kit—electronic chassis, manuals and pedals—that you can assemble yourself. You mount it in a home-size console.

3 Foodarama puts refrigerator and freezer behind double doors in one upright cabinet. The left-hand freezer section has an unrefrigerated spot for bananas.

4 This new stove folds up into the back splash of a kitchen counter. The electric units—two burners each—are built into the counter, separately or in groups.

Further information on these products can be obtained from: 1. Prestoflex Corp., P.O. Box 735, Mason City, Iowa; 2. Electronic Organ Arts, Box 41084, Los Angeles; 3. Kelvinator Div., American Motors Corp., Detroit 32; 4. Frigidaire Div., General Motors Corp., Dayton, Ohio; 5. The Contemporary Shop, Williamsburg, Mich.; 6. Walsco Electronics Corp., 3602 Crenshaw Blvd., Los Angeles 16; 7. Post Lite, Inc., Indiana & Illinois Sts., Des Moines; 8. Chicago Combustion Co., 318 Cliff Lane, Cliffside Park, N.J.

5 Baby bath clamps high on a wall near bathroom or kitchen faucet so mother needn't bend over for bathing chore. It folds flat against wall when not in use.

6 Knobless TV set has station selector and volume control on a 20-foot cable that runs under the rug. Set is engineered so that no other adjustments are necessary.

7 Let there be light on steps, walks and patios. These post lights can be built into wrought-iron, steel or aluminum rail. A tubular incandescent lamp sheds the glow.

8 Barbecue cart eliminates the fuss and bother of fire-making and ash disposal. It burns bottled gas. Broiler handles two steaks or a dozen hamburgers at a time.

The big news

YOU USED TO SEE these cruisers only at yacht clubs. Now they're all over.

HIGHWAY SERVICE STATION attendants now wash your boat's windshield, too, when you drive in.

MANY TOWNS now have boat derricks. You can sling your own boat overboard in a few seconds.

Strange things are happening than ever before. And

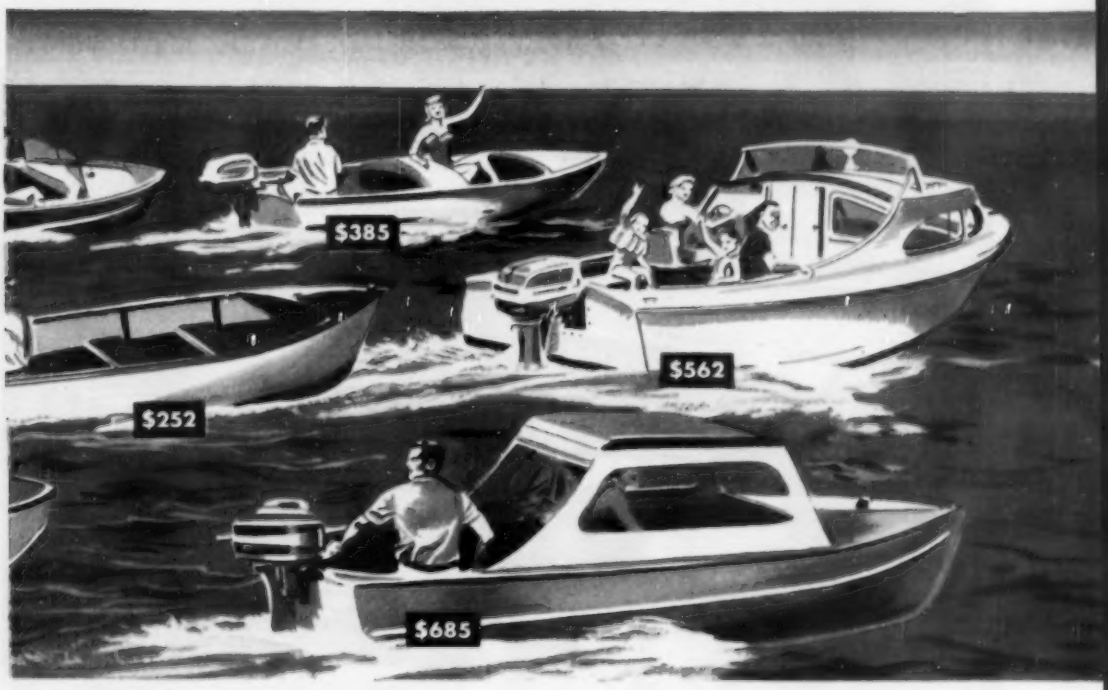
By Edward D. Fales Jr.

"WE'RE not sure yet what hit *us*," yelled one big U.S. boatbuilder, above the roar and clatter of his assembly line.

"But we do know what has hit the American family. It's an incredible boom that you might call back-yard boating. People who don't want, or can't buy, yachts have suddenly discovered that you can have a whale of a lot of fun on lakes and rivers in little 'semi-cruisers' that tuck away in your back yard.

1955 BOAT SHOW

is the boom in 'back-yard boating'



to boats this spring. They're wider, faster, cheaper, you can whisk them right out of the water into your garage.

"We're swamped with orders. Why, we're even selling to cowboys in Wyoming and bus drivers in the dust bowl."

Boatbuilders are still blinking at their own progress. Boats this year are changing every time you count 10. One big builder (Chris-Craft) has just tossed a mountain of blueprints in the ash can. These were the designs of last year's boats. All but one were redesigned for 1955, which is extraordinary because this builder makes 44 different models.

Such a thing has never happened before. The retooling cost was tremendous. Yet to some degree everybody is doing it. From $39 kits to $130,000 yachts, boats are changing. They're getting wider, faster, safer—and purtier. Also: *cheaper!*

"Do you know you can now buy your family a sweet little cruising bucket for $200 down and $20 a month?" said one builder.

True, your "semi-cruiser" won't have all the comforts of a fine yacht. But in some ways you'll be *more* comfortable. For example, you no longer have to tow a rowboat to get ashore. Today's flat-hulled cruisers skid right up on the

WEEKEND CRUISERS roll down a highway in Wisconsin en route to join an Outboard Club cruise. Some boatowners now tow their trailers as far as 300 miles before launching. Thus many cruises now consist of highway travel as well as a water trip. Note canvas boat cover which can also shelter occupants if it should rain during the cruise.

beach. Some can go to sea, but most are for sheltered waters and you'll be happier in a storm if tied up to a tree.

A few years ago builders suddenly discovered that the average family is willing to rough it a little and doesn't need a fancy yacht. And it was that discovery, plus big, quiet outboards, plus plywood and plastics, that spawned the "semi-cruiser"—half cruiser and half canvas-topped convertible.

"Semis" range from 14 to 22 feet. Not all have canvas tops you put up at night. Some have hardtop half-cabins; you can add canvas if you wish.

Not all have outboard power. Quite a few have inboards, and you may see more. For the inboard builders are fighting desperately to capture some of the sensational outboard sales (expected to top 500,000 this year).

"Those outboard guys caught us sound asleep," said one builder. "But they also taught us that a lot of people like small motors pushed aft out of the way.

"Within a year we expect to see a brand-new 40-horse *inboard* power pack so small that you can hide it under the floor, or tuck it away aft where you now keep your outboard.

"That's our answer to the outboards. When we get it—*just watch our smoke!*"

Boats drawn on pages 154-5-6 are: $39 Penny Woodcraft kit; $69, $116 and $252 Chris-Craft kits; $315 Aluma Craft; $385 Plasti-Craft; $395 Ozarka; $562 U-Mak-It kit; $685 Super-Chief Holiday; $795 Regal; $2,125 Lyman; $2,395 Bryant.

This is Gay Paree ...a whale of a big boat for $1,099

"IF ANYONE had said five years ago that you could build a big cruiser like Gay Paree for that money, I'd have said he was crazy."

A veteran boatman was speaking, referring to Chris-Craft's plywood-hulled Gay Paree, a brand-new idea in boats and the best clue to the revolution now taking place.

Gay Paree is what's called a day runabout but she sleeps two in the little cabin, two more on cockpit cots. She's probably the biggest little boat ever built: only 19 feet 10 inches long, but nearly eight feet wide!

On one 25-horse outboard, Gay Paree slips along at 19 m.p.h.; a second boosts her to 27 m.p.h. It's a sign of the times that GP comes built for *either* an outboard or inboard power plant. You take your choice.

Fitted with a 60-horse inboard she will run you $2,399.

If GP looks like a flower garden afloat, that's the missus' fault. Her color is a rosy hue called "flame." Her bottom sides are bright gold. You can see how the ladies are muscling in with the designers these days!

GAY PAREE costs less than a small car, even including price of motor. A 25-horse outboard will run you something over $400. Note the width of the cockpit.

ANOTHER SIGN of how boat shapes are changing is this decklike shield over outboard motors on Arkansas Traveler all-aluminum 20-footer. Boat took two years to develop.

And this is

THE brand-new 1955 job shown at right is a new idea in boating. It's a "camper boat" and it's so big inside that Thompson is designing a *tent* to go over her. "In 10 minutes," says Grant Thompson, "you put up your tent over the cockpit and you're in camp for the night."

The tent will have plastic windows. If, when daylight comes, you want to leave the tent up, just zip out the windows and zip in some screens.

Thompson's camper boat is only 18 feet long, but nearly seven feet wide. Like Gay Paree she's inexpensive: $1,140 plus motor. Weight: 875. Her tough sides are lapped plywood strips. In one test (see page 160) she carried 13 people (far too many for ordinary use).

How come builders are suddenly able to pack so much bigness into small boats? Gay Paree and the "camper" aren't much longer than a park lake canoe.

The answer: While hulls are getting wider and wider, lines are flattening out. There are fewer curves. Internal bracing has eliminated braces that used to get in your way.

Only a few seasons back motorboats were shaped like cigars. Now they're more like cigar boxes—light but strong.

And it's still only the beginning. "Our experimental department," says Thompson, "is red-hot."

Meanwhile boats are getting "style." "Our designers seem to be trying to keep boats from looking like boats!" said one builder. "This year even the heads will be classy."

TENT TO COVER this huge cockpit will look something like sketch at right. The camper boat's hull is tough, for rough sea use.

"SEMI-CRUISER" CABINS look like this inside—small but comfy. Head is under the center cushion in this 16-foot Chris-Craft kit job.

1955 BOAT SHOW

called a 'camper boat'

(...it will have a tent)

No dinghy needed: New cruisers can run right up on a quiet beach. You just hop ashore.

Trimotor boats? It's being tried—with beefed-up transoms

WHAT EXTRA POWER DOES: 18-footer overloaded for test with 13 people was unable to plane until two Mercury 40s were hung on transom. Then she got up and planed at estimated 24-26 m.p.h.

Will there be a horsepower race?

. . . or will boats, like planes, go to three or even four motors? Here's the tip-off on some new developments.

"WATCH Scott-Atwater," said one boatbuilder. "If their new 30 sells, then the power race is on."

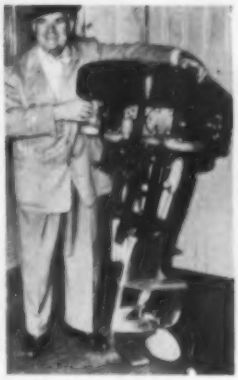
Not everybody agrees. Johnson and Evinrude, the GM of outboarding, have stabilized, at least for the hour, on 25 hp. tops. Their idea: If you want more push, get *two* motors. A lot of people are doing it. In fact a few have tried *three*, experimentally.

But is it better to get 75 hp. from three 25s or two 40s? That's a big question for '55. And that's why builders are hawk-eyeing Mercury's four-in-line 40s, along with the S-A's 30 twin.

Meanwhile the ear-shattering outboard roar is gone, muffled in rubber, springs, hoods, intake silencers, and in exhaust tubes so tuned that one sound stifles another.

Even for the little 3 and 5-5½-hp. fishing motors, still heavy sellers, and on up through 7½, 10, 15 and 20 series you now can get remote control and dual controls. You're getting gearshifts, push-button or key-turn starts, dual exhausts, twist-grip throttles, higher compression, and up to 5,000 r.p.m. The new 1955 motors run like a fine automobile engine.

ALL EYES are on Scott-Atwater's new 30. Will she sell well and touch off a horsepower race?



GOLIATH OF OUTBOARDS, this 75-hp. Riley costs around $1,000. Will such monsters compete with inboards on larger cruisers?

ROBOTLIKE ELGIN has "horsepower key." One twist, you get 7.5 hp.; twist again, 15 hp.; third twist, 25 hp. Key is at top right. Gearshift turns like handle on a gas stove.

1955 BOAT SHOW

Here come the

By Kenneth Wylie

PSM reporter joy-rides the Cobra. He still has his teeth —but where's his toupee?

IF YOU'VE been hunting for a boat loaded with verve, vim and wham, you probably don't need to go any further than the Cobra, a brand-new runabout so hot it almost sizzles when it hits the water.

Assuming that you generally keep a Ferrari in the carport and mink in the closet, this sports boat, rocket-tailed and raked down to the water, is going to be hard to get along without. At factory listings ranging from $3,450 to $5,330 for the two 18- and 21-foot models, the Cobra is not even outlandishly expensive. In fact, it's one of the cheaper vessels in the Chris-Craft stable.

The Cobra is quite frankly intended to impress—pilot, passengers and landlubbers alike. In the more maneuverable 18-footer you go like a water beetle. In the 21-footer you go like a bat.

The larger boat, pushed by a 200-hp. Chrysler Marine V-8, will hit 50 m.p.h. With a 285-hp. Cadillac V-8, it gets into the 50-55 mile range.

The 18-foot model with one of four Chris-Craft

Sped by a 285-hp. Caddy engine, Cobra

'sports-car' boats

L-heads under the hatch makes these speeds: 95 hp., 34 m.p.h.; 105 hp., 36 m.p.h.; 120 hp., 38 m.p.h.; and 131 hp., 39 m.p.h. A 158-hp. L-head drives the 21-foot Cobra at about 42 miles an hour.

Besides bald speed, this water skate has a whole hull full of features. One is a wrap-around windshield equal to anything Detroit bends. Another is a saucy, porpoise-nosed bow that seems to be hurtling ahead even when the boat is moored. Then there's the beautifully finished mahogany construction, glittering white deck jointing and upholstery, gold-vinyl cushions, and black lizard cockpit trim. There's the gold hatch and topside rudder pressed from polyester laminate, and finally, flush my scuppers, there's the promise of the new Cadillac marine conversion.

In test runs on the St. Clair River, this writer found nothing lacking in speed or comfort. The Cobra gets out and digs, but that's only the beginning.

I took the Cobra's wheel, was checked out by the company man riding beside me, and headed out into choppy water on a gray, windy day. It looked as if we would be swamped for sure if we tried making speed in those waves.

The Seating Is Low-Down

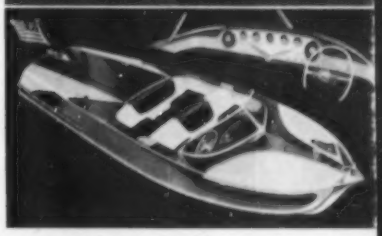
In a sports car you sit low enough to frazzle your britches on the pavement, but at least you're on *top* of the runway. In this machine you seem, at first, to be sitting down under the water. Not for long though.

I eased back on the pull throttle, the Chrysler rumbled, and we knifed out through the ragged water. We were running flat and heavy with the river.

This was fine, but we weren't planing the way motorboats do in the pretty pictures. So I started

[*Continued on page 264*]

This new job goes 54 m.p.h.



THE SWANKY JOB with lots of "living space" (top) is actually one of the fastest things afloat. It's Century's new 20-foot Coronado which, says its maker, has been clocked at 54 m.p.h. with a Cadillac 285-hp. engine. (With the same engine Chris-Craft rates its Cobra in the 50-55 m.p.h. range). The Coronado is a brand-new speedster with a white landau top which, next year, will roll forward in grooves.

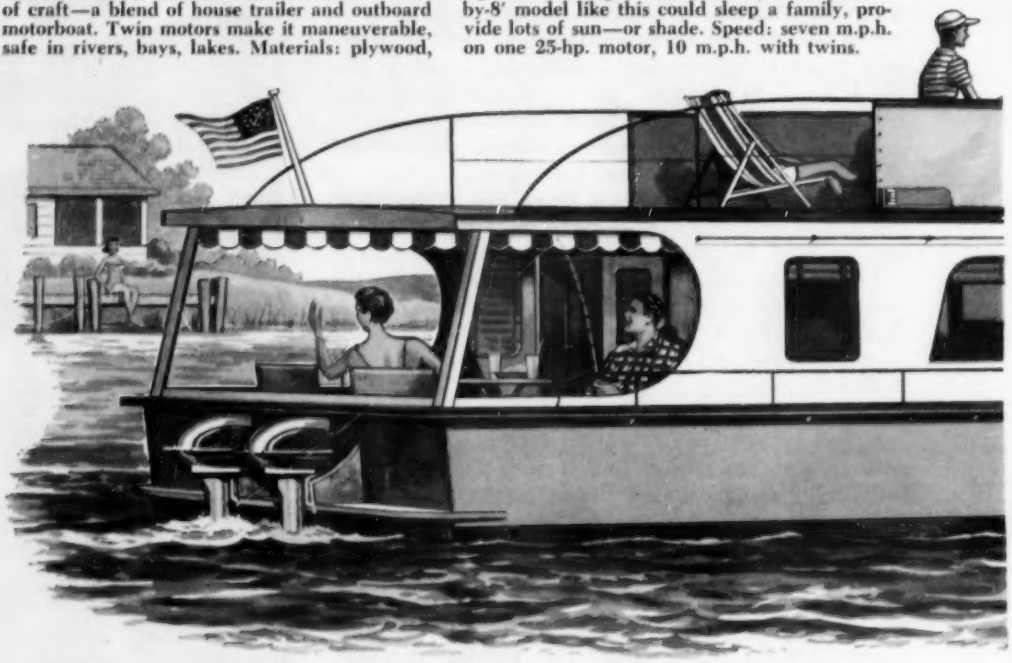
Lower picture: flashy but more conventional is Century's new 18-foot Arabian, which will do 45 m.p.h. with 160 hp. Colors are "Bimini blue & dawn gray." Note the dressy automobile-type dashboard panel.

roars into a fast turn, then takes off

Meet the seagoing house trailer

It will be a marriage of cruiser to house trailer

ALREADY OVER THE HORIZON is this new kind of craft—a blend of house trailer and outboard motorboat. Twin motors make it maneuverable, safe in rivers, bays, lakes. Materials: plywood, light metals or glass fiber. Roomy inside, a 21'-by-8' model like this could sleep a family, provide lots of sun—or shade. Speed: seven m.p.h. on one 25-hp. motor, 10 m.p.h. with twins.



A LIGHTWEIGHT "cruising cottage"—perhaps even a highway house trailer that can travel sheltered seas—is an idea that's popping up all over the boat industry. There are one or two outboard houseboats now. Rich Line has a 29-foot job with screen doors, dinette and wheel wells for highway hauling.

"You know what keeps going through my mind?" said a builder. "An outboard house trailer—with retractable wheels. It would make a fine home on land or water."

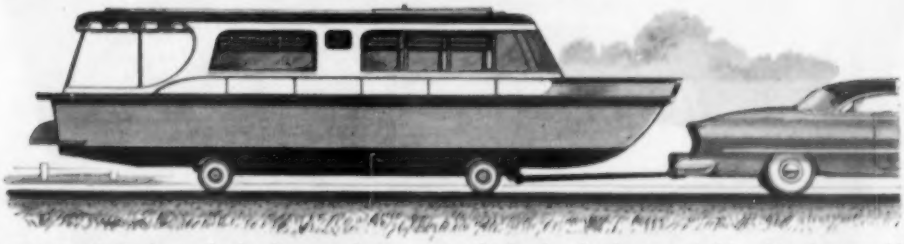
Some think the future may lie this way, rather than with fast cruisers. "After all, at 25 m.p.h. you soon run out of water. But a family pushing along at seven m.p.h. can get a lot of fun on a river."

There are problems, of course. One is width, for eight feet is the maximum on present roads. Seaworthiness may be a limitation, though not necessarily. Prof. John Paul Jones of the University of Florida has traveled many river miles in a 28-foot homemade houseboat, and has weathered many a squall that scoffers predicted would bring disaster.

Home is where you hang your outboards

THESE PIONEERING OUTBOARD HOUSEBOATS have lots of sun deck, picture windows, "porch" space and living comfort—for cruising or loafing. *Polywog*, left, has cruised in 14 states with one family, can be easily hauled by trailer. *Slo Poke*, right, has fine lines.

They're beginning to think about this:



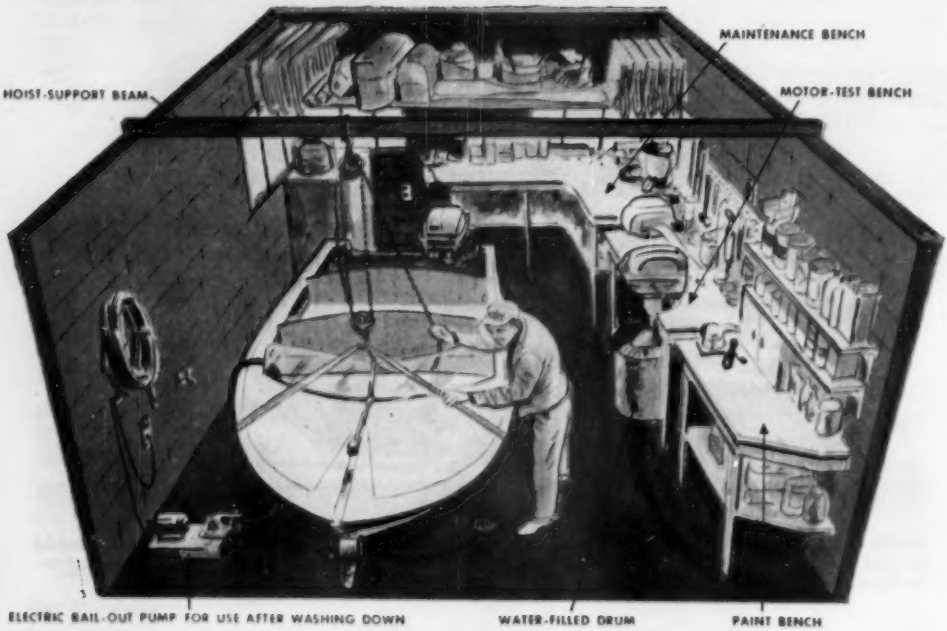
WHEEL WELLS, for trailer-hauling, are being put by one builder into his new houseboat models. At least one other manufacturer is beginning to think of a land-sea craft like this that would have retractable wheels, be its own trailer. Sun-deck sides fold down for road travel.

Double garage makes it

BEFORE Stanley Koch built a double garage, his car was crowded out by his boat, the *Glory B.*

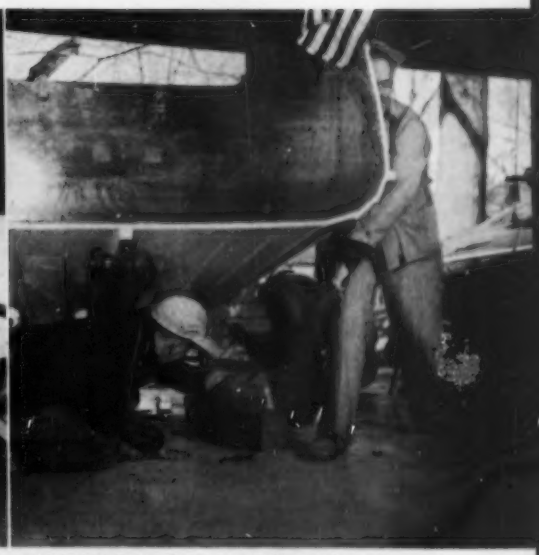
AFTER he provided a place for it, taking care of both the boat and the car was much easier.

How to lay out a boat garage at home



easy to park a boat

FIRST THING Koch does after a cruise is hose boat down, inside and out. Then he has to pump boat out. To do it he built this portable pump which bails boat dry in two minutes.



LAST THING Koch does, if *Glory B* is to remain idle for several weeks, is pry up wheels with crowbar while Bill blocks up axle. This keeps high-speed tires free of weak spots.

LIKE many boatowners' cars, Stanley Koch's Oldsmobile stood out in the rain last year. The Koch family boat, *Glory B*, a new 16-foot Thompson "semi-cruiser," had moved into the garage.

Koch, who is director of tube research for Du Mont Television, decided this was unfair to Oldsmobiles. So, he has built a two-car garage at his home in Clifton, N. J. He parks the car on the left side, the boat on the right. The reason for this arrangement is that Koch found he could back his boat trailer in better on the driver's side. Before he learned this trick, Koch, on several occasions, nearly left propeller prints on the opposite wall.

First thing that happens when the family comes home from a cruise is: Mrs. K. and daughter Gloria take clothes, light baggage, picnic hampers, out of the boat. When the ladies have finished, Koch and son Bill get to work with the hose, flush out the engine even though it's a new non-corrosive type, and clean the boat *inside* and out.

Then comes a problem: how to get the water out of the boat? By this time it's settled 10 inches deep in the bow, since *Glory B* (named for Gloria and Bill) tilts forward.

"Used to take us 20 minutes to bail her out," says Koch. "So Bill and I made a fast bailer. I dug up an old quarter-horsepower washing-machine motor and mounted it to spin a small gear pump. Now we just toss a hose in the boat, spin the pump and bail out in two minutes flat."

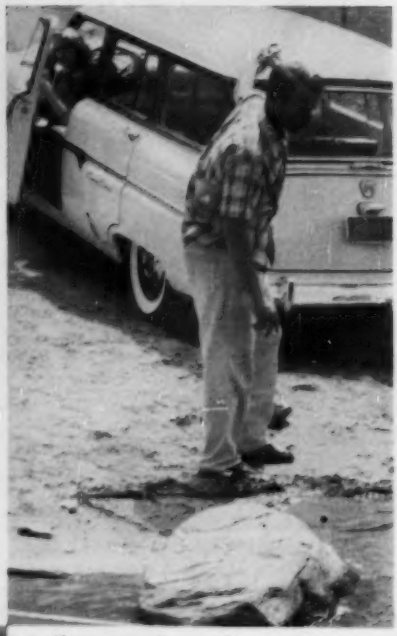
Next, unless *Glory B* is cruising every weekend, Koch crowbars the axle up on blocks to save the tires. And *Glory B* settles down in her garage home until the next family cruise.

Today's trailers make

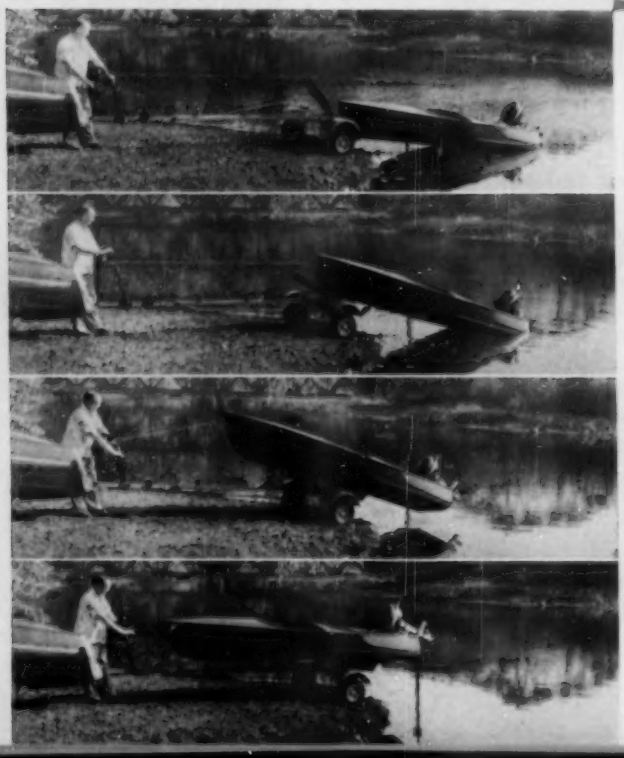
THIS year's trailers are going classy. They're putting everything on them but TV. You'll see continental streamlining, deep-dish fenders, and rainbow colors. The use of electric brakes is spreading, and also tip-up booms that boost your baby into the water. There are hydraulic shocks, and built-in clearance lights like those that trucks use.

And winches. You no longer have to crank a trailer out the hard way, any more than you have to crank a station wagon. The day when you plunged, gasping, into ice water to jockey a hull on a trailer is gone. Now (see below) you flick her out single-handed, almost with a finger, using a 7-to-1 winch or even a 10-to-1. With a pulley on the boat's stem, you can increase your advantage to 20-to-1.

Now they're making winches powered by your car battery. You may have floodlights, soon, for night launching. This summer will see wider use of rust-proof and sealed-bearing wheels, new high-speed balloon tires that "float" on mud, retractable nose wheels, and telescoping tongue bars that can be lengthened for longer boats.



She steers, he guides, as the



They all but jump out at you

HOW TILT-BOOM trailers work. At a pond in Connecticut a boatman (top) slowly winches in his runabout. The "lifting-loading-launching ramp" is tilted. Next, the ramp (or boom) tilts back in place as boat's weight comes on rollers. Now boat is entirely out of water (third photo). Finally, (bottom) boat is in place. (This trailer is a Mastercraft.) In Texas, the other day, the 105-pound wife of an executive of the Little Dude Trailer Co. winched a big 21-foot Owens cruiser out of a lake single-handed.

launching a cinch

trailer backs neatly into lake. Fat new tires that won't sink in mud make it an easy job.

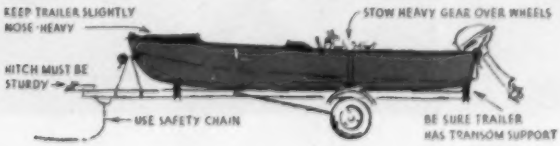
Be sure you get a strong enough trailer

"One of the handiest things about a boat trailer," says Stanley Koch (page 166), "is this: we heave all our car baggage into the boat!"

A lot of boaters know this trick; it keeps the car pleasantly empty. But it also clues you to one of the dangers in buying your first trailer. Don't get one that's too frail!

The worst mistake you can make is to expect a trailer of 400-pound capacity to haul a 400-pound boat. Because if you're like a lot of other families you'll carry a mountain of gear in that boat. And if it's an outboard job, you may have 200 pounds of motors hanging over the stern.

Learn to think of a trailer as a faithful old pack mule; if you load it down too much it will simply give up the ghost. Springs break, frames bend or crack, and you may find your family yacht hard aground in the middle of Route 22! So here's a rule of thumb: total up your boat's weight, and weight of motors, gas, anchors, cushions and clothes, radio, mattresses —everything. Then add 25 percent to the whole thing!



HERE'S AN IDEA: Keep a spare hitch on your front bumper and you don't have to back your boat into the water. Keeps your car's rear wheels on firm ground. And at night you can shine your headlights on the boat and on the trailer.

1955 BOAT SHOW

New gadgets

WITH an estimated 21,000,000 Americans taking to the water this year, it's not surprising that there's a growing crop of gadgets on the market. Here are some of the new ones:

The speed wand (1) is an inexpensive plastic tube that you just stick in the water as you go cruising along and then pull out to read like a thermometer. It's calibrated from five to 35 m.p.h.

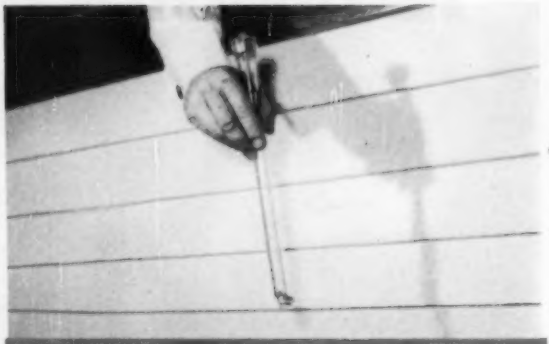
There's a "velvet" anchor (2) that has the beef of the conventional one but won't mar finely finished decks, because it is coated with a tough plastic. And a kit (3) to make a boarding ladder—very handy after swimming. A wrap-around windshield accessory (4) is so pliable it can fit almost any craft.

Like big ones, little boats now can have a rudder-angle indicator (5), which works off flashlight cells and is handy for calculating drift. A miniature davit (6) takes back strain out of the job of horsing a big motor off or on a transom, and is especially handy on boats with motor wells.

To solve the problem of convenient entrance or exit from a boat with a convertible top, there's a new one out (7) that flips back on either side. And as a switch on Detroit's bumper-guard bumper guards, a new tilt-up motor mount (8) hangs over the transom but doesn't put motor loads on it.

For small-boat sailors who want to keep in touch with the mainland, there's a new portable, battery-powered ship-to-shore phone (9). It's licensed for the owner, not the boat, and enables you, if you wish, to put in calls from an amusement-park rowboat.

Further information on items pictured can be obtained from: 1. Betzel Co., Arlington, Tex., $3.95; 2. Whitman & Robinson, Weedsport, N.Y., $5.75 up; 3. Hotchkiss Co., Sherman, Conn., $5.95; 4. Olaf Mikkelsen Co., 393 Fourth Ave., NYC, $28.50 up; 5. Columbian Bronze, Freeport, N.Y., $59.50; 6. Topper Co., 5816 Ritchie Hwy., Baltimore, $20. 7. Chris-Craft, Algonac, Mich., $175 up; 8. Esnon-Dakin, 9900 Freeland, Detroit, $59.50; 9. Sonar, 3050 W. 21 St., Brooklyn, N.Y., $339.50.

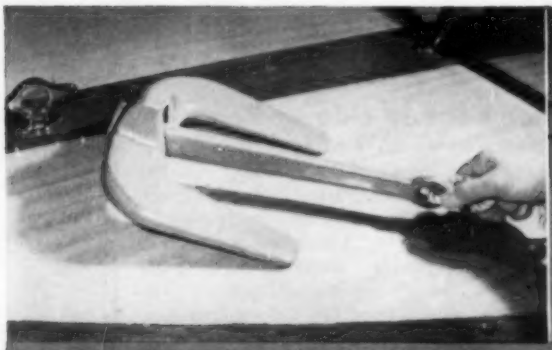


1. Speed wand: dip it in water

4. Wrap-around windshield: it bends

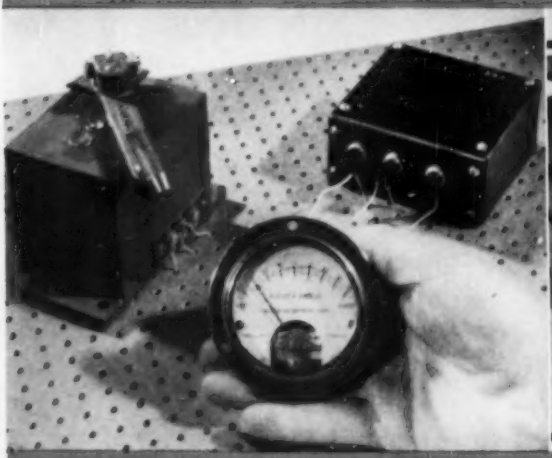
7. Flip-top: it's easier to get out

lure small-boat sailors



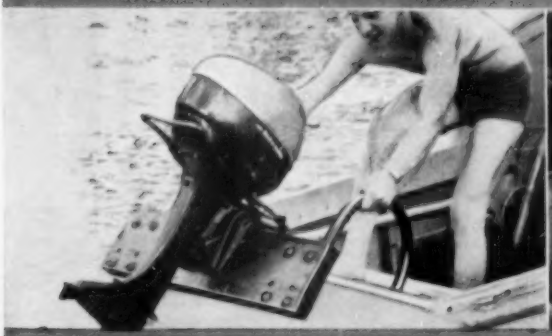
2. "Velvet" anchor: won't scratch

3. Ship's ladder: make your own



5. Rudder-angle telltale: helps steer

6. Motor davit: to hoist outboards



8. Tip-up motor mount: for any hull

9. Ship-to-shore: for small boats

1955 BOAT SHOW

New Ideas FROM THE INVENTORS

Trailer boat to ride or float

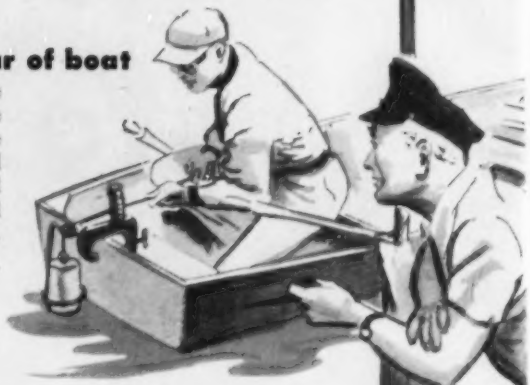
You wouldn't have to rassle a boat onto a car or trailer if it had detachable wheels and a trailer hitch. Three wheels—in individual yokes—would hook into eyelets attached to the hull. In normal use, you'd float the boat, then detach the wheels; coming out, you would re-wheel the craft before beaching it.

Patented by Karl H. Dahlkvist, Palo Alto, Calif.

Clamp to hold anchor clear of boat

This C-clamp winch would save space in a small boat by keeping the anchor outside and eliminating the usual tangle of rope. The cylindrical weight would be raised and lowered on a pulley. A bumper ring would keep anchor from banging the boat.

Patented by Robert J. McCullough, Celina, Ohio.



Guard to retract outboard

The prop of this inboard outboard couldn't foul or shear its pin. When guardrails in front of the prop hit an obstruction, they'd simply lift the motor. The outboard would be clamped to a sliding panel inside a columnlike well. With springs taking up most of the motor's weight, even slight pressure would raise it.

Patented by Morton D. Cohen, Minneapolis.

Platform to turn boat into float

EVEN a small rowboat might serve as a midstream diving and swimming float if it had a platform and ladder assembly clamped athwart the prow. This one would fold for compact transportation and storage.

Patented by H. J. Picker, Mechanicsburg, Ohio.

Scale to mark fishing spot

WITH this three-point protractor you could be sure of relocating a good fishing spot. Before leaving it, you'd line up each hand on some fixed object. When you returned, you would sight along the scale pointers until all three indexed on the same objects.

Patented by Claud A. Herrick, Rochester, N. Y.

Fender to hitch small boat

MOORED by this strut, a boat could freely rise and fall with the tide. A long, ball-jointed pin would lock into an oarlock socket but permit vertical movement. When not in use, the fender would hinge down over dock. Springs would resist swinging motion.

Patented by W. Herbert and W. Hanley, Kalamazoo, Mich.

Gus Pulls a Switch

Three cocky schoolboys get a grounding in auto wiring—and a new respect for their elders.

By Martin Bunn

IT WAS ten-thirty and long past Gus Wilson's usual quitting time when a pair of dim and doleful headlights turned in to the Model Garage and a 1940 sedan pulling a trailer limped up. Three teenage boys and a middle-aged man hopped out.

"We're having battery trouble," the tallest of the boys said. Throwing an impatient look at the middle-aged man, he added, "Again!"

The man came forward, his eyes behind his rimless spectacles as dim and doleful as the headlights of the car. He removed his felt hat and scratched the fringe circling his bald head.

"I fear there is something very wrong with my battery," he said in a precise voice. "Although it is virtually brand-new, this is the third time in three days we have been compelled to have it recharged."

Gus Smells Trouble

"Sounds like a short," said Gus easily. He lifted the hood and began probing around with his flashlight. There was a familiar hot-insulation smell, but it was too faint to pinpoint.

The little man peered over Gus's shoulder. Three pairs of youthful eyes followed the beam of Gus's light.

The boy who had first spoken said, "Mr. Wismer, would it be a good idea to find some place to spend the night, since we may be stuck here for quite a while?"

"An excellent notion," exclaimed the man. "I'll do that right away."

"Might try the Commercial Hotel," Gus suggested over his shoulder. "I have a couple of rooms there and it's mighty comfortable."

"Thank you. Do you have a phone?"

"Right by the door," Gus said without looking up.

When Mr. Wismer was out of hearing, one of the boys exclaimed, "The only good thing about this rig is Ned's trailer."

The tall boy chuckled loftily. "Thanks, Arnold. Made the whole thing myself,"

"They don't have much faith in us, do they?" Gus observed, puffing thoughtfully on his pipe.

he explained to Gus. "Started out with a front axle from the junk yard."

"So," said Gus. He loosened the clamps on the battery cable. "We might as well give it a quick charge while we're looking for the short."

"The Whizzer insisted we use his car," Ned told Gus. "Felt responsible. Didn't even want me to attach my trailer. He was afraid something would go wrong. Something went wrong, all right, but with his precious car, not my trailer."

Mr. Wismer returned from the phone. He shook his head sadly. "No vacancies."

"Where are you bound for?" Gus inquired, clipping on the leads from the quick charger and easing up the charge-rate control.

"Williamsburg, Virginia," replied Ned. "They're holding the finals of the National Early-American Crafts Exhibit there tomorrow. All the winners of the state contests are competing. We're representing our state. My trailer's full of our stuff."

"What time do you have to be there?"

"We have to check in not later than tomorrow at seven p.m. At this rate we'll never make it."

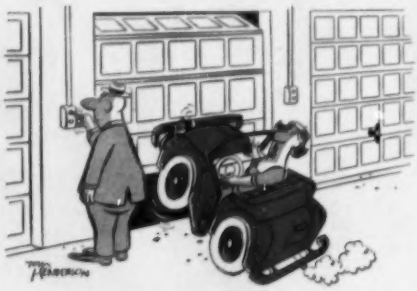
Arnold, by this time tired and discouraged, could contain his impatience no longer. "Gee, Mr. Wismer, I should

think you would have had your car checked before we left."

"I did, Arnold," replied Mr. Wismer patiently. "Right after my last history class, the day before we left, I had it thoroughly checked over."

"Probably had his wife sweep out the back seat with a whisk broom," one of the boys muttered. Mr. Wismer didn't hear him, but Gus did.

"Tell you what, boys," the proprietor of the Model Garage suggested. "There's a hamburger joint across the street. Why don't you run over and stoke up? It's going to be a long night. If you took turns driving, you could get to Williamsburg easily by tomorrow afternoon."



"Not with this old crate breaking down every hundred miles," Ned retorted.

"Bring back a pair of hamburgers and coffee for your teacher and me," said Gus. "While you're gone we'll scout out the trouble."

This last statement elicited an anonymous hoot as the boys turned and headed across the street.

"They don't have much faith in us, do they?" Gus observed, puffing thoughtfully on his pipe.

Mr. Wismer coughed apologetically. "They're really good boys," he said. "But they're pretty discouraged by now. You know how kids are. They think that because I teach history, I don't know anything about anything else."

Gus Studies the Trailer

Gus turned back to the car. He couldn't help liking the little schoolteacher who stood beside him. He rocked the trailer with his hand. "Seems pretty sturdy," he said.

Mr. Wismer nodded. "Can't blame this trouble on the trailer, I'm afraid."

Gus turned his flashlight on the underpart of the trailer, ran it along the steel supports, over the wooden body and back to the two tail lights.

"Where are these plugged in?" he asked.

"On the other side," Mr. Wismer replied. He led Gus to the left rear tail light. "Right here. Ned made an attachment for plugging in the trailer lights."

Gus bent over and pulled the plug out. The wire was suspiciously warm.

"I think we've found your trouble," he said quietly. He examined the prongs of the plug and ran an expert eye along the wires, which were stapled to the side of the trailer. He looked at the bewildered little schoolteacher quizzically.

"What do you say we teach those young smart alecks a lesson?" he suggested. "Do you mind a little deception—in the interest of education?"

Mr. Wismer's pale eyes twinkled. "In the interest of education—why not?"

Mr. Wismer Is Nonchalant

A half-hour later, when the boys returned, they found the garage dark and the doors locked. Gus had gone home. Mr. Wismer was seated at the wheel studying a map by the illumination of the dome light. He accepted the hamburgers and coffee that the boys proffered.

"Where did the garageman go?" one of the boys asked.

"He recharged the battery and went home," Mr. Wismer replied.

"Did he fix the trouble?" Ned asked.

"He just went home," Mr. Wismer said.

"That square didn't know anything about cars," Arnold announced.

Mr. Wismer let that pass.

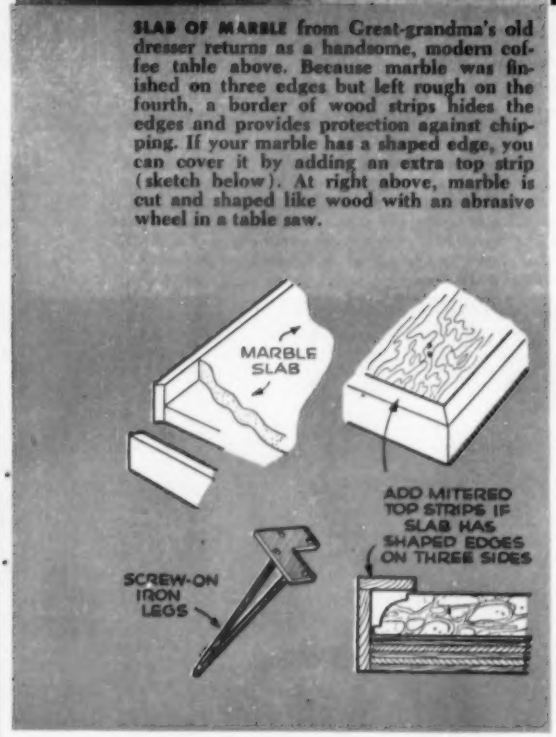
"We might as well get going," Ned suggested. "We probably won't get far, but we can't sit here all night."

The boys piled in. Mr. Wismer care-

[*Continued on page 246*]

MECHANICS *and* HOMEBUILDING

SLAB OF MARBLE from Great-grandma's old dresser returns as a handsome, modern coffee table above. Because marble was finished on three edges but left rough on the fourth, a border of wood strips hides the edges and provides protection against chipping. If your marble has a shaped edge, you can cover it by adding an extra top strip (sketch below). At right above, marble is cut and shaped like wood with an abrasive wheel in a table saw.



It's easy to build the new

Marble-Top Furniture

By Sheldon M. Gallager

THE marble that went out with Grandma's spinning wheel is coming back into style. All over the country, furniture designers are bringing out fancy, gleaming marble pieces. You've probably seen them in stores at equally fancy prices.

This is furniture you can build yourself. Because of the special qualities of marble—its built-in beauty, its prefinished appearance—you can actually

Cementing wood to marble lets you add legs easily

achieve professional results more easily than with wood or other materials.

A set of legs may be all you need to convert a salvaged slab into a shimmering coffee table. Small scraps, used to top off furniture that you already have, may give old pieces a new lease on luxury.

Unlike Grandma's spinning wheel, the use of marble makes as much sense today as it did a century ago. You may not care for a marble-topped dresser or commode, but modern living calls for surfaces that you can clean quickly and easily, heatproof tables that you can serve a hot meal on right in the living room (Grandma never ate while watching a TV show), and outdoor furniture that will withstand the weather.

Low-cost luxury. Marble isn't as expensive as you might think, either. While it runs from $2 to $6 or more per square foot (bought new), you need so little of it to create a striking effect that the overall expense is small.

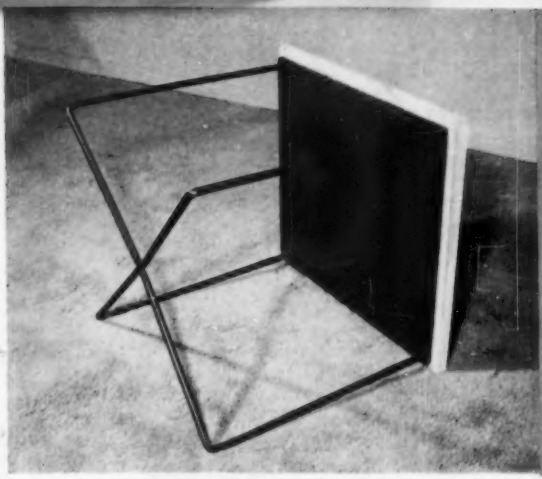
Except for the oval coffee table, which cost about $27, you can build any of the projects shown here with about $15 worth of marble—less if you pick an inexpensive variety, and still less if you use the tricks shown that let you get by with used or scrap pieces.

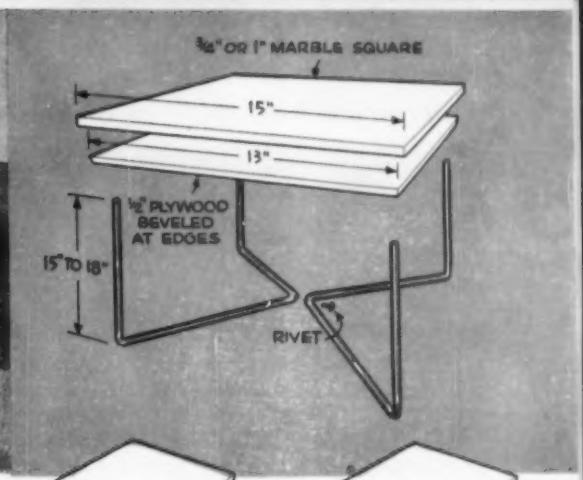
Keep it simple. Marble's best friend, the Marble Institute of America, at Mt. Vernon, N.Y., has this to say:

"Marble went out of fashion with the Fifth Avenue mansion; it deserved to go

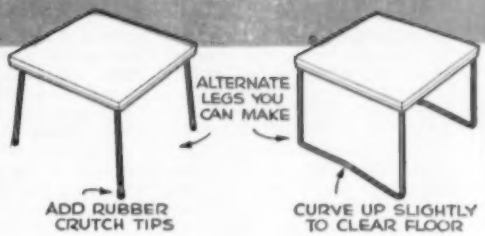
CHAIR-SIDE TABLE seems to have an all-metal base, but support for the marble is actually plywood, painted black, with holes drilled at the corners to hold the bent-rod legs. Marble is bonded to wood with new contact cement, available at hardware stores. Table was designed by Martin Stan Buchner, Whippany, N.J.

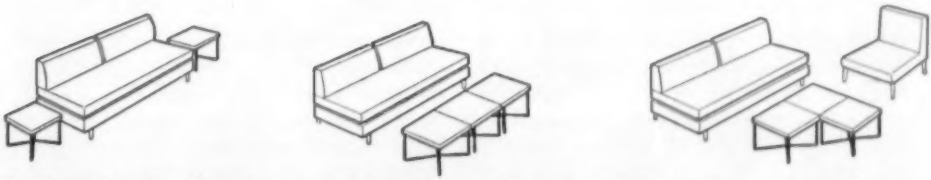
THIS SLEEK OVAL TABLE looks totally unsupported, but the secret is a wood base hidden under the top. The marble is a heavily veined, dark-green Italian type, called *verde fraje*, that requires full bracing underneath to prevent its fracturing. The base, made of ¾" plywood, is cut to the same shape as the oval marble, but is 2" narrower all around to keep it from showing. To have the marble cut, lay out the larger oval on cardboard or hardboard and take the template to a marble yard. Bonding the marble to the base with contact cement helps keep the wood from warping and throwing an extra strain on the top.





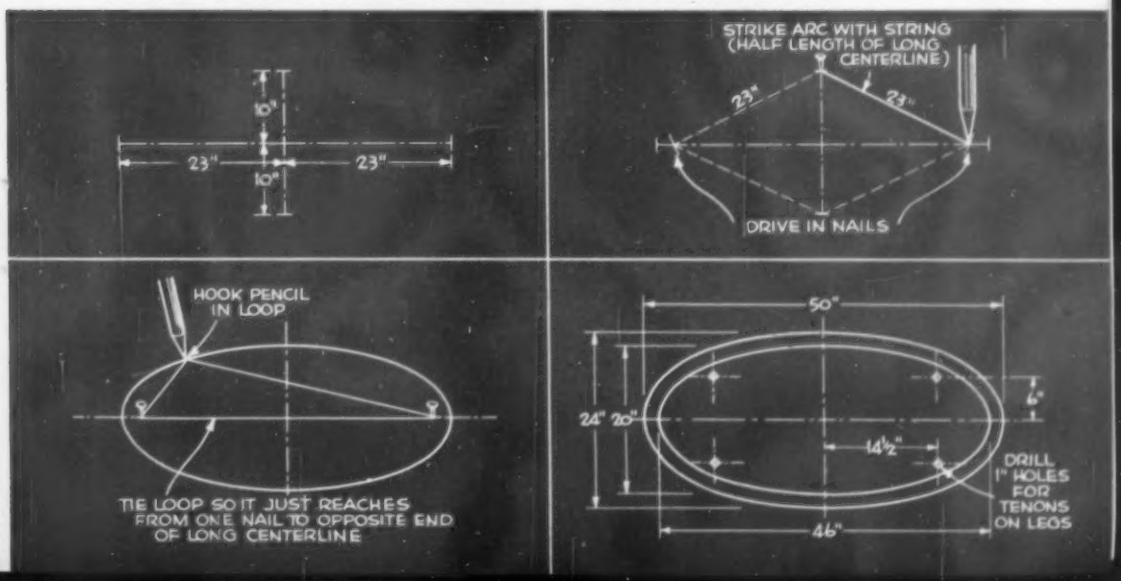
LEGS LOOK AS IF THEY CROSS, are really two right-angle bends, pinned together at the points with a single rivet. Made of ⅜" soft-steel rod, they can be easily bent in a vise with a hammer to this or other designs of your own. Legs are locked in plywood by drilling through edge and rod, and inserting brads.





Small tables fit easily into any furniture arrangement, can be built one at a time.

LAY OUT OVAL by drawing two centerlines at right angles, one for the width you want and one for the length (upper left, below). Here the base is 20" wide by 46" long, and the marble 24" wide by 50" long. Then strike an arc with string from one end of the short centerline and drive nails in at the two points where it intersects the long centerline (upper right). With a loop of string hooked around the nails, you can then draw a perfect oval. Legs here are turned on lathe and mortised into the base, but you can screw other types directly to the underside of the plywood. Table was made by **Harry Baum, New York City.**



You can work marble with ordinary wood tools

RAGGED EDGES can be trimmed off quickly with an abrasive cutoff wheel (resin bond, C24 grit) in a portable electric saw. Saw lets you make face cuts where there are no smooth or straight edges to use as a guide. Make a number of very shallow cuts, instead of one big one, to avoid straining blade. Sheet of cardboard keeps saw from scratching marble.

TABLE SAW, with an abrasive wheel in place of the blade, lets you square up marble as easily as a plank of wood. Use a coarse-grit, flexible-type silicon-carbide cutoff wheel, and make successive shallow cuts as with a portable saw. You can also use the side of a flexible wheel like a sanding disk to smooth the edges after cutting and to shape curves.

SMOOTHING edges and corners is easy with an abrasive file like this, used wet to keep down dust and improve cutting, or with ordinary 2/0 or 3/0 garnet paper wrapped on a block. For final finishing, rub gently with a very fine aluminum-oxide cloth or paper. For all sawing, grinding or sanding operations, wear goggles to protect eyes from flying particles.

out, for it had been badly misused. In an era when good taste was blatantly sacrificed in favor of the most expensive gaudiness, marble, which increased in price with each inch of tortuous carving, was literally chiseled and hacked unto death."

That's the secret of marble's comeback —simplicity. And since modern lines are simple, they're also simple to make. You can take the barest slab and create a handsome piece without adding a single adornment beyond what's needed to hold it up.

Marble is where you find it. POPULAR SCIENCE MONTHLY's contributors throughout the country report that they have found marble at quarry yards, lumberyards, and other readily available sources either in their own communities or nearby. Junk yards, storage houses, Salvation Army depots, and auction houses sometimes have used marble that can be bought cheaply. Possibly there's an old piece in your own attic.

If a piece is stained and musty, you can clean it up to look like new. Broken or scrap pieces can be cemented together, or you can cut smaller pieces out of them.

How you can work marble. You may think of marble as a rock, something you can't do anything to, or at least not without an expert craftsman. Actually, you

How you can clean old marble and keep it looking like new

IF IT'S CLEAN ALREADY, you can keep it that way by wiping up spilled liquids immediately and giving it a periodic washing with warm water.

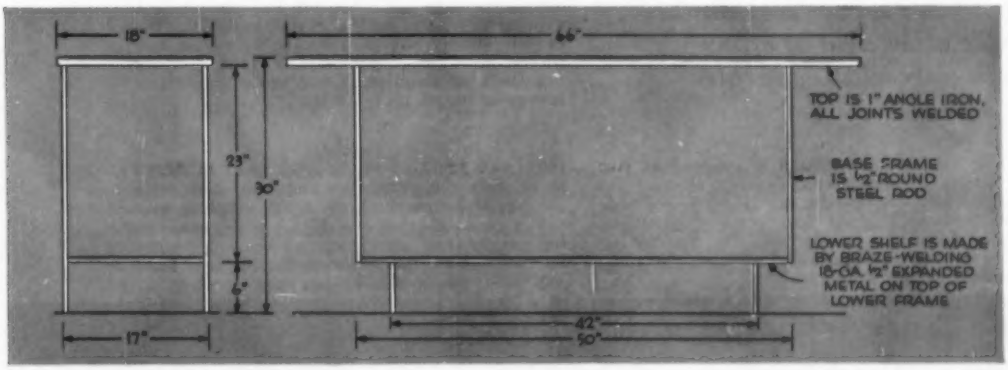
IF IT'S DIRTY through long use, wet the surface with hot water, scrub with a mild, nonabrasive detergent, using a clean fiber brush, then rinse thoroughly to remove any traces of detergent. Dry immediately with a chamois or clean lintless cloth to avoid streaking.

IF IT'S STAINED, here are the three main types to watch for: *organic stains,* caused by such things as tea, coffee, soft drinks, fruit juices, anything containing vinegar, iodine, ink and tobacco; *rust stains,* caused by lamp bases, ash trays, nails, bolts and any other metallic objects left in contact with marble; *oil stains,* caused by hand creams, salad dressings, modeling clay, anything greasy, and milk products.

You can build this table with scraps and use it anywhere

OUTDOORS, this rugged steel-and-marble table makes a weatherproof picnic server. Top is three separate pieces so you can use inexpensive marble scraps. Slip the legs into casters and it rolls in or out as seasons change.

INDOORS, it's a dining buffet. You can braze the frame, as here, or have the parts welded at a local shop for a few dollars. Lower shelf is 18-gauge, ½" expanded metal. Table was made by John Rogers, Dallas, Tex.



IF IT'S ORGANIC, first wash with ammonia and rinse thoroughly. Remainder of the stain must be bleached out with a poultice made of 17- to 20-volume hydrogen-peroxide hair bleach (available at most drugstores) and some powdered whiting (available at all paint stores). Mix whiting and bleach to a thick paste, spread over stain, then add a few drops of ammonia to start the reaction. Keep damp by covering with plastic food wrapping for several hours.

IF IT'S RUST, you may be able to remove fresh stains by rubbing with a dry cloth. If not, use a special rust-reducing agent, available at chemical-supply houses and many tile and hardware stores, and apply as a poultice in whiting or according to the directions.

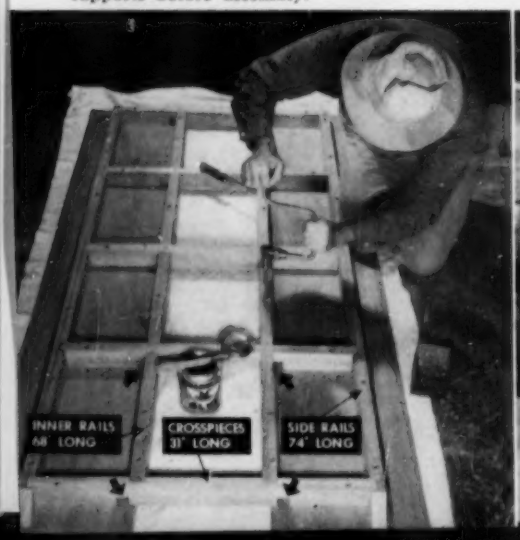
IF IT'S OIL, use a solvent consisting of amyl acetate (from a chemical-supply house) and acetone (available at most drugstores) mixed together in equal parts. Apply as a poultice mixed with whiting, let stand until dry, then rinse off and repeat if necessary. If stain persists, bleach it out using the method described for organic stains.—*Bernard Gladstone.*

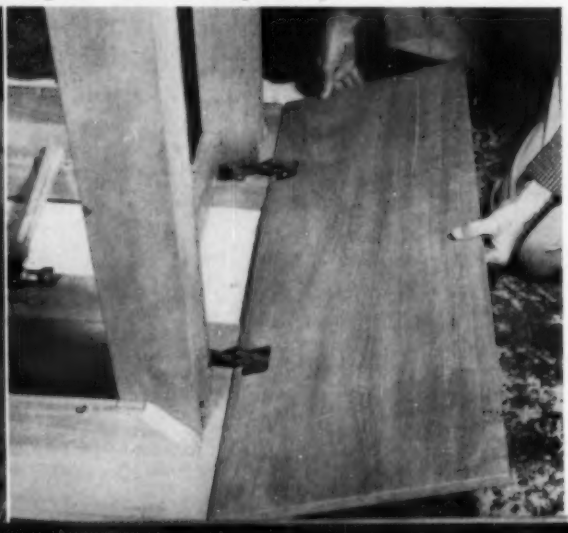
Hot-food server set into this table gives a lot of effect with only a little marble

A NARROW MARBLE STRIP not only adds a luxurious touch to this table, but lets you use less-expensive woods as the major material. The marble simply sits in a recess, is cut in two pieces, each 11⅜" wide by 38" long, that lift out for easy cleaning. Table seats six without leaves extended, up to 10 with.

FRAME OF TWO-BY-THREES is screwed to two 13½"-by-76" top planks, leaving channel for the marble. Crosspieces are dadoed into side rails and half-lapped like egg-box partitions where they cross inside rails. Be sure to cut 1"-square notches (arrows) for the drop-leaf supports before assembly.

LEGS ARE FOUR-BY-FOURS 29" long, rabbeted to fit over the endpieces and bolted on with the heads countersunk to avoid snagging any nylon knees. Leaves are 13½" wide, same as top planks, and 38⅜" long. Lazy-tong hinges let them swing down and under the top, leaving table ends free of lips or steps.





Built-in marble slabs let you put your walls to work

can work marble in your own shop (or without a shop) with very little more difficulty than many common building materials.

Soft marbles can be cut with a hacksaw, drilled with ordinary high-speed steel bits. The harder types can be sawed with an abrasive cutoff wheel and bored with a carbide-tipped masonry drill. Both can be ground, filed, sanded and polished with ordinary tools.

If you want to skip the elbow work, you can have a marble cutter do the job for you. One of the biggest costs, though, is the finishing of edges. You can save on this if you buy your marble rough-cut and finish the edges yourself.

Restoring old pieces. You can mine your own marble from salvaged scraps and long-forgotten relics at little or no cost but a strong right arm.

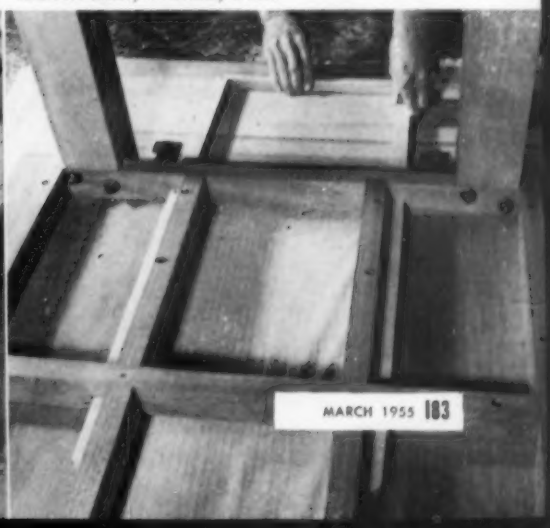
Worn, marred or scratched areas must first be sanded smooth before you can restore the finish. Start with a coarse No. 220A wet-or-dry paper, finish with a fine No. 400 wet-or-dry until the spot blends with the surrounding surface, then wipe with a damp cloth. Slight depressions caused by such sanding are usually not noticeable.

After sanding smooth, you can restore dull spots to their original high luster with putty powder. This is a mixture of three parts chemically pure tin oxide (from a chemical-supply house) and one

A SWANKY DRESSING TABLE in an abandoned alcove is one of many ways you can use surrounding walls to simplify construction. Here a 4′-long marble slab is supported on only 1″-by-3″ wood cleats screwed to wall studs at each end and across the back. (For more heavily veined marble, slab should be backed up by plywood shelf for extra strength.) Corners, recesses, dormer-window openings, are spots where you can put walls to work for you. Built-ins hide all but one edge, saving you cost or work of polishing ones that don't show.

TAPERED CLEATS near ends of leaves add strength, help prevent warping. Cut their inner ends at a 45° angle to match that of side rails when leaves are dropped. For a richly solid appearance, you can add 1½″-by-3″ bevel strips to side rails as shown. Both strips can be bevel-ripped from a single two-by-four.

DROP-LEAF SUPPORTS are two U-shaped frames of 1″-square oak or other hardwood, sanded to a snug sliding fit in the table notches. When fully out, supports should still extend through notches in the inner crosspiece. Fasten a block under the leaf for a stop. Table was made by Darrell Huff, Sonoma, Calif.



You can use this trick to make fake marble that looks real

THIS SHIMMERING SLAB is cold to the touch, solid to feel, and gives that opulent clink of real marble when you knock it. The secret, seen at right, is a cast concrete slab covered with plastic marble veneer. Make a form of 1" wood strips and hardboard, here 20" wide by 44" long. Pour in mix (three parts sand to one of cement), press in wire mesh (½" hardware cloth), and embed legs on top. Remove form after several days, patch with plaster, and paint to seal pores. Plastic veneer is then squeegeed on to remove air bubbles and trimmed at edges and corners with razor blade. Table was made by Richard Day, Monee, Ill.

part oxalic acid (from a paint store). Better wear rubber gloves while handling this stuff.

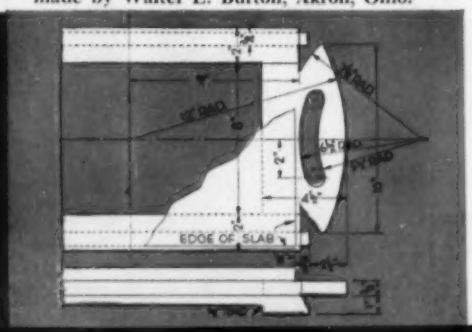
Mix the powders in a glass or porcelain dish and only a teaspoonful or two at a time. Ball up a small pad of clean, lintless cloth, dampen it slightly, and dip it in the powder mix. Wet the spot on the marble and rub it briskly with the pad until a shine appears. Keep the powder wet while you're rubbing and wipe it off as soon as you're through so it can't dry out and leave a ring. If a ring does form, you can remove it with a little more of the damp powder.

Waxing keeps it shiny. Once you've restored a piece, and on new marble too,

[*Continued on page 262*]

An all-purpose work slab is at home in any room

PORTABLE SLAB is a heat pad for kitchen or table, a hot-drink server, or an easily cleaned tray for toilet articles in a bedroom or bath. And when you're not looking, you may find Junior cutting out model airplanes on it. You can make it any size with a small scrap of marble supported on a wood base such as the one shown below. Slab can be fastened on with contact cement or pinned to the base by running small bolts up through the wood and into snug holes drilled in the marble. The tray was made by Walter E. Burton, Akron, Ohio.



Wall-Switch Plate Frames Photo

You can make attractive and inexpensive photo frames from the plastic wall-switch cover plates sold in a wide variety of colors and designs at most dime stores. Attach the photo to the back of the plate with cellulose tape and use a triangular flap behind it as a stand.

For wall mounting, a little rubber cement will hold the frame firmly in place and leave no nail holes to be patched when you take the picture down again.—*M. C. Fleming, Pittsburgh, Pa.*

Linseed Oil Restores Bristles

Soaking in linseed oil will revive a paintbrush that has lost its flexibility through continual cleaning in thinners. Wrap the bristles in heavy paper before immersion, to restore their shape.

Camp Stove Frees Car Lock

Marooned on a camping trip when we found our car-door lock had stuck, we remembered the old locksmith's trick of squirting solvent into the tumblers.

Removing the tank from our gasoline stove, we pumped it up and, holding the needle against the keyhole, opened the valve. The fine stream of white gas squirted in quickly freed the lock.—*W. Roberts and B. Caithamer, Cicero, Ill.*

Modelmaker's Thousandth Project Gets Place in Smithsonian

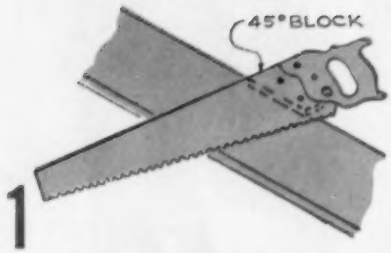
By day Herbert Hartwick makes tools and dies that help in turning out Lockheed planes. By night he builds model planes and machines. Recently he completed his thousandth home project, a metal scale copy of the *Maiden Dearborn*, built 30 years ago by William Stout and Henry Ford.

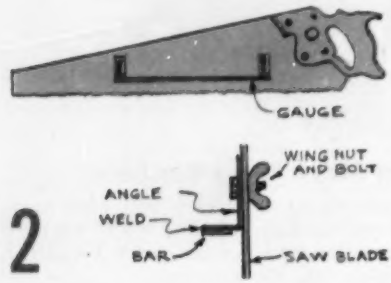
Commissioned by the Women's National Aeronautical Association, Hartwick's aluminum-covered model has been presented to the National Air Museum at the Smithsonian Institution, Washington, D. C.

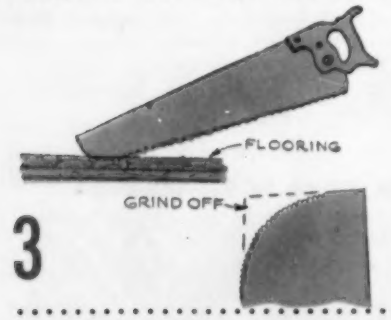
The *Maiden Dearborn*, originally called an "improved air pullman," was converted into a freight carrier. It inaugurated air-mail service between Detroit and Chicago on April 13, 1925.

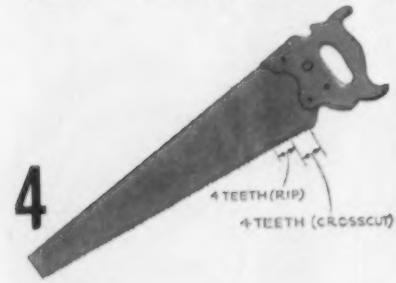
8 Handsaw Tips

By William B. Eagan









STARTING with the days when journeymen carpenters carried only a saw and a hammer to a job, the handsaw has found many and varied uses. Because of its thin, straight-line design, you can readily adapt an ordinary saw to substitute for other tools, or for time-saving short cuts and shop kinks. Here are some tips that have been passed down by the old-timers. They are still good and may save you the expense of buying a new tool by making your saw do the extra work.

Since drawing a line on a piece of lumber is generally followed by sawing, it is practical to use a straight-back saw blade as a square. You can do this by fitting a small hardwood block against the handle on each side of the blade. Make one 45° with the back, as in **Fig. 1**, and the other 90°. Drill or punch two holes in the blade, and rivet the blocks to it. You can put a hole in a saw blade with a high-speed twist drill in a hand drill, using a generous amount of cutting oil, or with a hardened punch and a lead-block backing.

It is important in sawing rabbets, dadoes and the like to keep the blade from cutting too deeply. A gauge like that in **Fig. 2** is an adjustable stop consisting of a length of thin metal bar welded at each end to a 90° angle. Slot the other legs of the angles and drill or punch holes in the blade to correspond. Attach with small bolts and wing nuts, set the bar to required depth, and tighten the nuts.

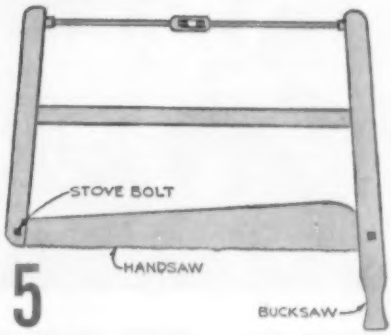
A rounded end on the saw, **Fig. 3**, will cut your time in half and result in neater work if you have to saw through a floor to do a wiring job or replace a bad board. It eliminates the need for boring a hole and using a compass saw. Round the saw end by grinding, and file teeth in the curved section.

You can use a ripsaw for both ripping and crosscutting by filing the teeth as in **Fig. 4.** After jointing and setting, if that is required, start at the heel and file four teeth at a 90°

Long the carpenter's most indispensable tool, your handsaw, with just a few minor alterations, can be put to many uses.

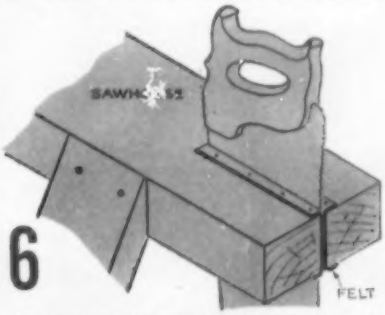
angle to the edges, as you would to sharpen a ripsaw. Next, file the second four at a 35° to 40° bevel, as for sharpening a crosscut. Then alternate the filing of groups of four teeth down the length of the saw.

Occasionally you may run into a job where you have to square up large timbers such as a 12″-by-12″ and find the handsaw difficult to manage. You can fit the blade into an old bucksaw frame, as shown in **Fig. 5,** for easier handling and elimination of sway. Drill or punch a hole at each end of the blade. You may find it necessary to shorten the central brace and adjust the turnbuckle rod.



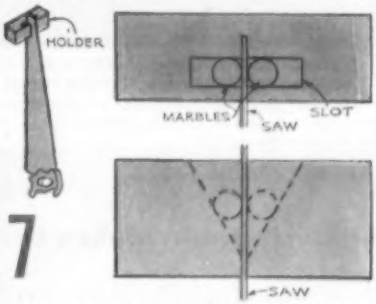
5

Proper care of a saw is important if you are to get the best service from it. Oiling the blade before, during and after a job should never be neglected. You can make a quick, efficient oiler of two strips of felt slid into a slot at one end of the sawhorse, as in **Fig. 6.** Let the felt overlap, and tack at top and bottom. You simply insert the blade near the handle and draw it upward. Oil on the felt lasts a long time, and you need not keep the oilcan at your elbow or handle a messy oiled rag.



6

When not in use, put the saw away where its teeth will not be damaged by coming into contact with other tools. A neat rack can be made by kerfing a length of two-by-four for as many saws as you have, and then chiseling a V slot in the top of each kerf, as shown in **Fig. 7,** to hold two marbles or steel balls. The saw is pushed up into the kerf between the marbles. When let loose, its weight causes the marbles to pinch the blade and hold it. When you need it again, push the saw up to release the hold of the marbles. Rack saws with the teeth in to avoid injury to anyone passing by, but take care not to bang them against the wall.



7

In spite of good care, you may crack a blade by accident. To permit continued use and prevent lengthening of the crack before you can have the place welded, drill or punch a hole in the blade just beyond the end of the crack (**Fig. 8**). Spreading will stop there.

8

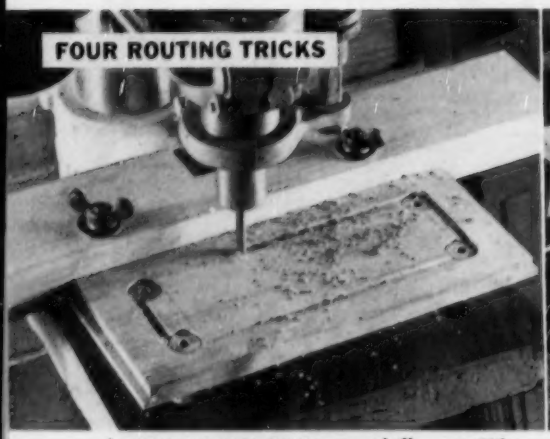
Sixteen Ways

Bored with just drilling

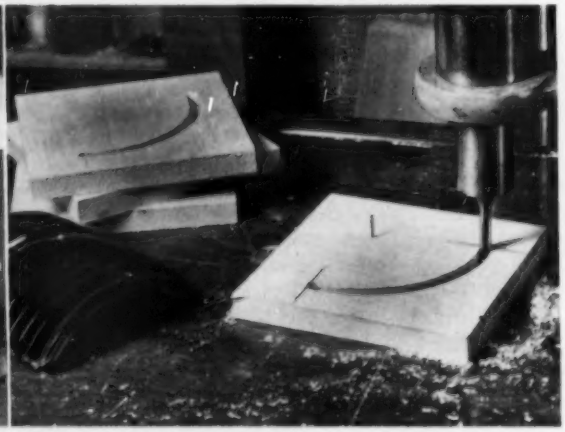
By Glenn A. Wagner

THE man who uses his drill press only for drilling is wasting one of the handiest tools in his workshop. Its vertical spindle is made to order for dozens of other wood- and metal-working jobs.

FOUR ROUTING TRICKS



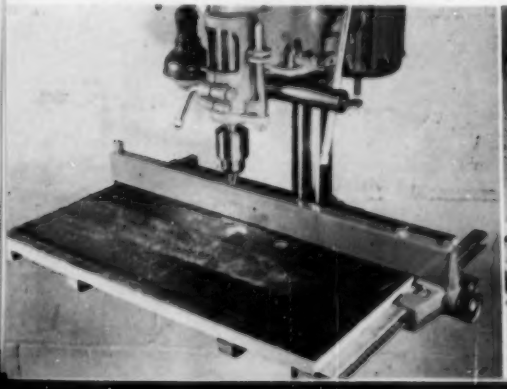
1 ROUTING IS A CINCH on a drill press. When you use large router bits the side thrust may be high, so don't hold them in a taper-mounted chuck—use a router chuck. Adjust the belt for highest spindle speed.

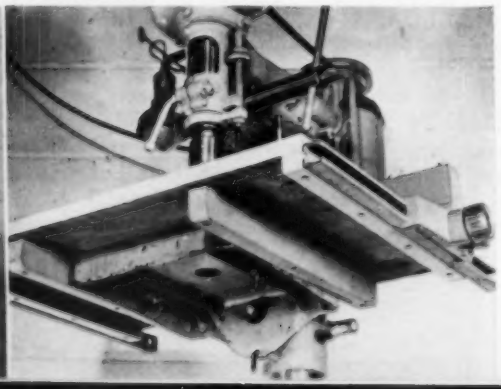


2 IN ROUTING A RADIUS, pivot the stock on a brad driven down into the wooden auxiliary table. Make several light cuts rather than one deep one. The groove shown here will hold the curved lens from a marine running light.

Auxiliary Table Makes Drill Press More Convenient

BIG PARTS can be handled easier if you make a large auxiliary table. It will give long work more support and enable you to attach guide strips and jigs with nails or screws. If you fit a circular-saw fence to the table, you'll be able to line up work with micrometer precision. The underside of this auxiliary table has two cleats to align it with the drill-press table. Loosening wing nuts enables you to slide the auxiliary table in or out.





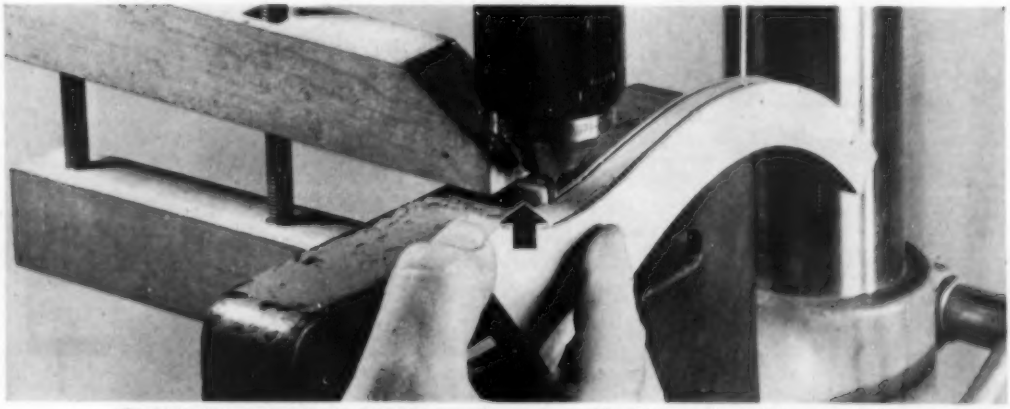
to Use Your Drill Press

holes? Here's a bale of other useful jobs your press can do.

With suitable attachments this power tool becomes a router, shaper, sander, planer and duplicator. It will cut accurate dovetails, form mortises, and serve equally well as a hole- or circle-cutter. A seemingly tricky job like fluting tapered table legs becomes a breeze when you fit the press with a simple aligning jig that you can knock together.

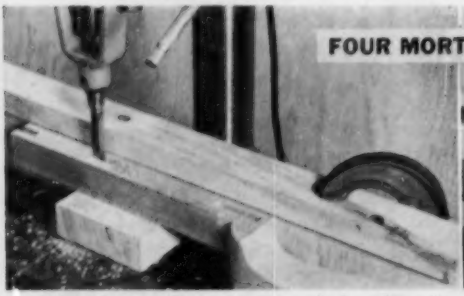
The pictures on these and the following three pages show some of the less common things you can do with this tool. If you are a resourceful craftsman, you'll undoubtedly think of others.

3 PRODUCTION-LINE MORTISING of model parts calls for a jig. The work is butted against a framing strip, the spindle brought down, and the whole jig slid under a fast-turning veining bit. Fence guides the jig. For angle cuts, mount framing strip at the desired angle.

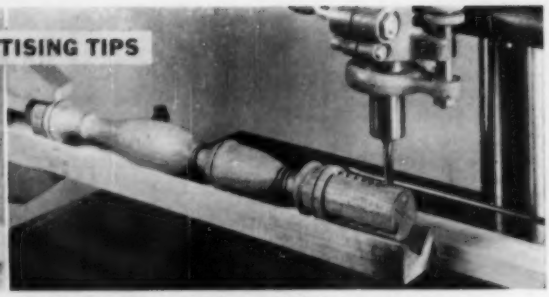


4 GROOVES FOR INLAY WORK can be cut along the curved surfaces of furniture parts by tilting and locking the drill-press table vertically. The work is fed up and along the table surface. Clamp holds a small protruding block (arrow) to limit the depth of cut of veining bit.

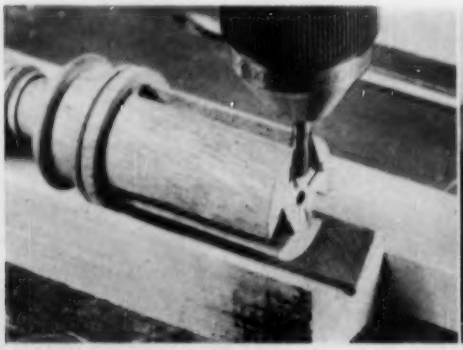
FOUR MORTISING TIPS



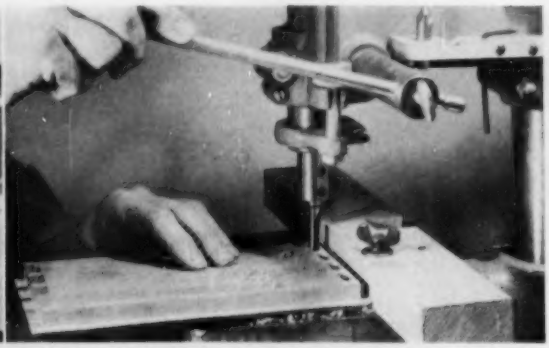
1 CUTTING MORTISES in irregularly shaped parts generally requires blocking them up and perhaps blocking them out from fence. Strip clamped on work is a hold-down that permits the mortising chisel to be withdrawn easily.



2 BIG MORTISES can be routed for speedy removal of stock. First use router bit vertically to bore out waste. Then use sliding cuts to smoqth the edge. Round work should be clamped in a V-grooved block.

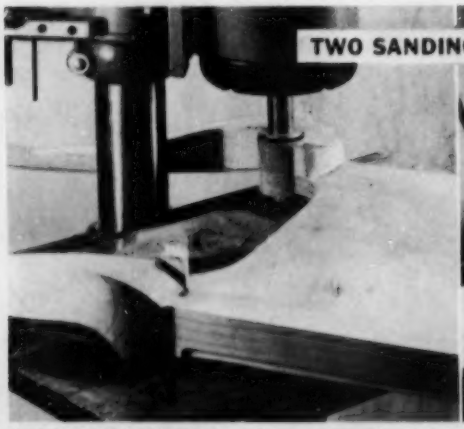


3 TAPERED CUTTER finishes off a dovetail mortise. Always make a conventional mortise first to clear out the bulk of the waste. Then a single pass of the dovetailing tool shapes the locking, undercut sides of mortise.

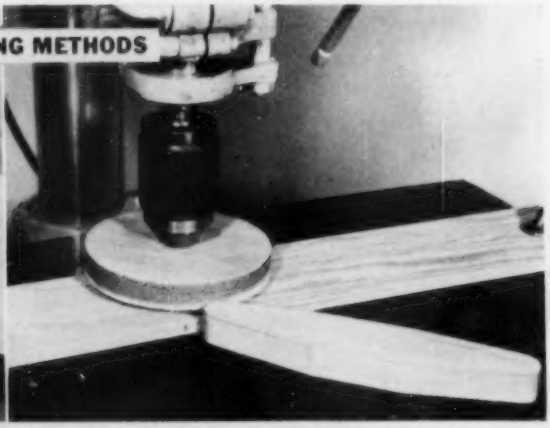


4 SPECIAL DOVETAILS that would require long and exacting work with chisel can be about 90 percent completed with a router. Use it like a drill and then finish with sliding cuts. A little chisel work squares the corners.

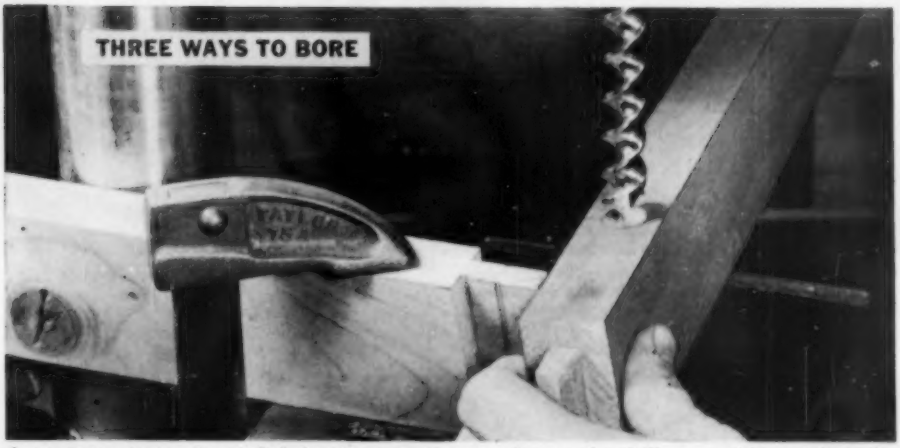
TWO SANDING METHODS



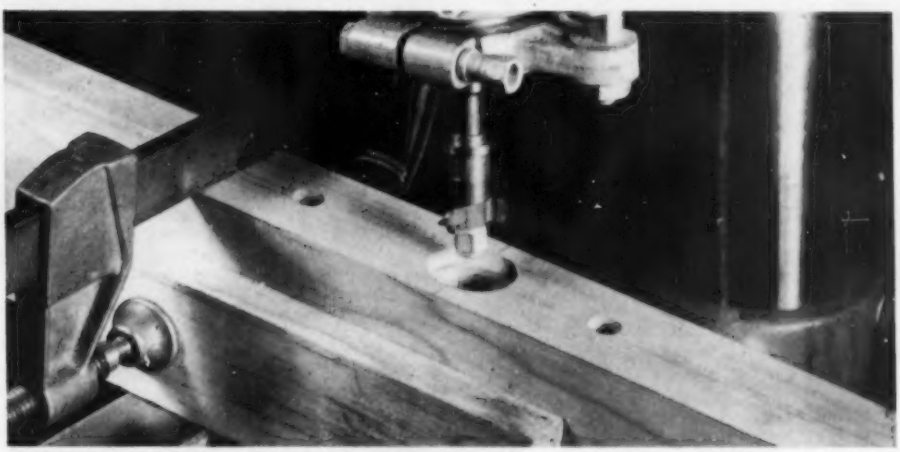
1 ON AWKWARD JOBS, where you need extra table support, this dodge may help. Sanding drum is attached to the motor shaft and the drill-press head is swiveled around column. Drum is handy on concave surfaces.



2 SANDING JIG is extra handy on production runs because it both sizes and edge-sands the workpiece. Rough-cut piece is bradded to a pattern that is turned against a fence. Disk with abrasive cloth glued on does the cutting.

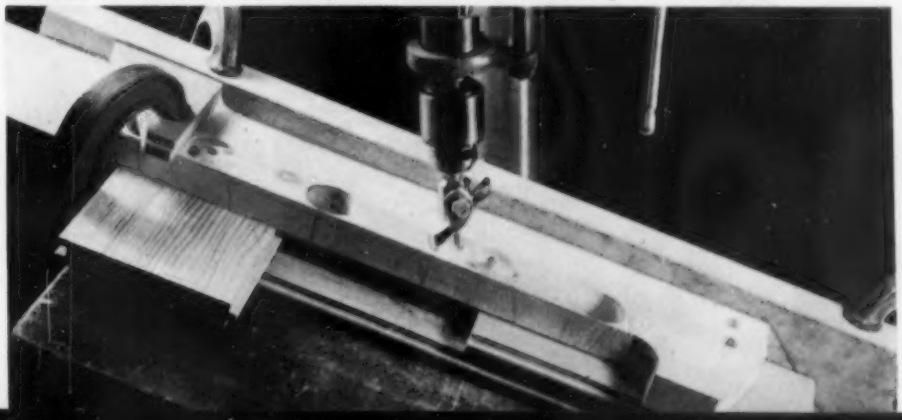


1 VERTICAL HOLES in angled furniture parts like a table stretcher can be drilled with ease if you use this trick. Just clamp an adjacent stretcher to the drill-press table and butt the work against the stretcher's sloping end while you drill the hole.

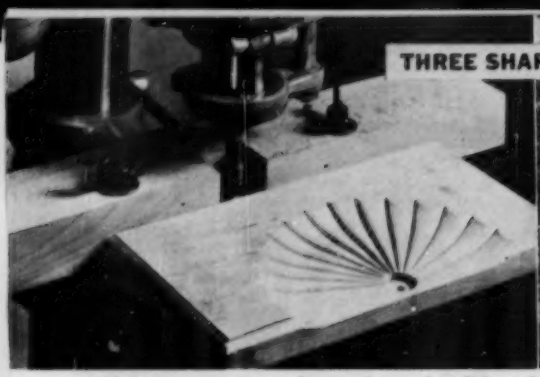


2 YOU CAN ENLARGE A DRILLED HOLE with a shaper cutter if you don't have the right size bit. During this operation, run the drill-press spindle at its slowest speed. The side block above was put in position to hold the stock for an angled hole.

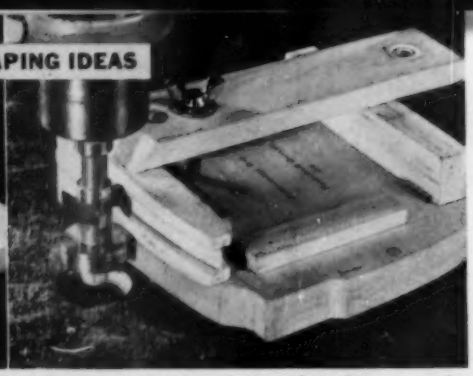
3 A CIRCLE CUTTER mounted in a drill-press chuck will handle holes up to 3". To avoid damaging the work, drill part way from one side and turn it over to finish. The pilot hole through the work will keep the cuts in register. Be sure to clamp the work down.



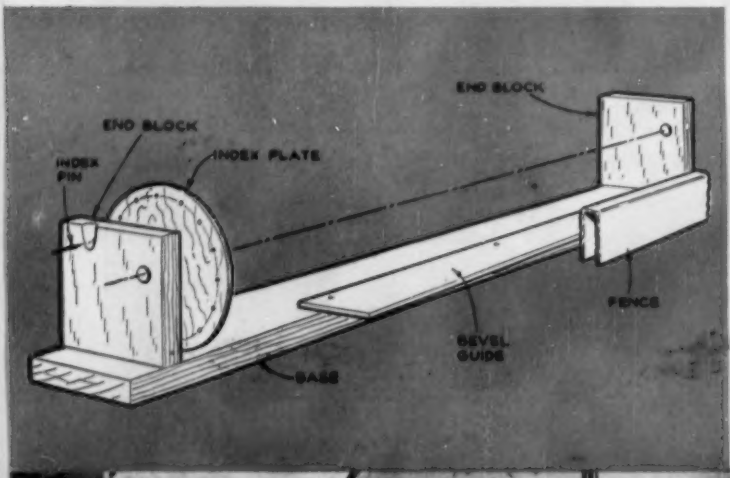
THREE SHAPING IDEAS



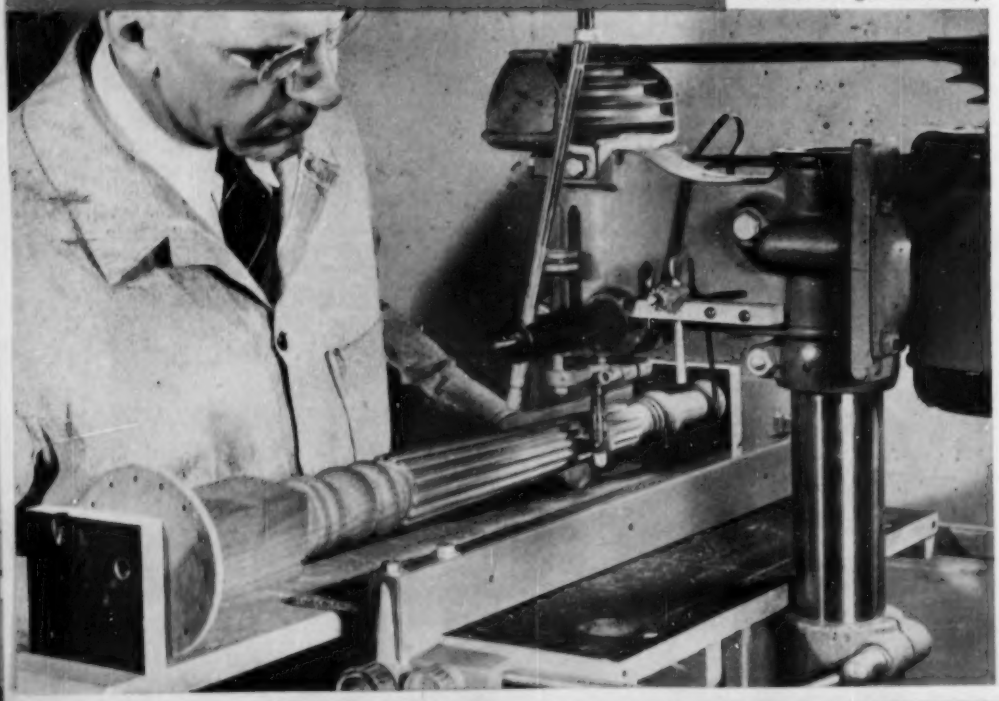
1 FANCY EDGES on drawer fronts, box lids and plaques may be produced with one or more molding cutters bridged by a hardwood fence. Do not use a taper-socket chuck for shaping; it may work loose while turning at high speed.



2 REPEAT WORK of irregular shape can be molded with a jig that bears against a guide washer. Backing blocks and clamp strip hold the workpieces on this four-sided jig. Multiple cutters permit combinations of shapes.



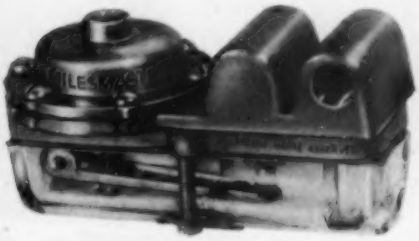
3 FLUTING a fancy turning is a drill-press job with this setup. Jig allows workpiece to rotate between wood-screw centers; plywood index plate is used to lock it for each cut. Nailed to base of jig is a guide strip angled to match the taper of the section to be fluted. Spindle is adjusted so cutter is at center height and locked there. A reeding cutter, turning at high speed, forms a flute. Then press is stopped, work indexed in next screw hole, and next flute formed. Jig should be rigid and sturdy.



New for Your Car

1. Lamp Is Signal and Spotlight. A take-apart lantern designed specially for the motorist faced with night emergency repairs on the road provides two lights in one. With its flashing red signal well back from the car, you can bring the clear spotlight beam right up to the work on a 25′ extension cord. A four-way on-off switch permits use of either light alone or of both together. Operation is by battery.

2. Jack Lifts Two Wheels. An attachment that clamps to a floor jack enables you to lift two wheels of a car simultaneously. By engaging the bumper it hoists either front or back wheels, and under the frame it lifts the wheels on a side. Its extra 11″ of jacking height provides better access under deep fender skirts.



3. Regulator Prevents Fuel Surge. This pressure regulator, installed between the fuel pump and carburetor, maintains an even flow of gasoline at a moderate pressure of about 2½ lb. It is said to supply gas to the carburetor at the exact rate needed at all speeds regardless of pressure build-up in the fuel pump. The removable glass bowl contains a special filter designed to trap metal particles in the fuel line.

4. Washing Windshield by Foot. One of the latest ideas in automatic windshield washers is foot control. For use on any make car with electrically operated wipers, the new-model washer sprays the windshield with detergent and sets the wipers in motion when you step on a pedal located just to the left of the brake pedal. Spray and wipers stop when you release the control. Installation is with simple tools.

Further information on these new car products can be obtained from: 1. Cable Electric Products, Inc., 234 Duboll St., Providence 7; 2. The Nuf-Lo Company, 3338 Hennepin Ave., Minneapolis 8; 3. Schneider Carburetor Co., 6218 Clayton Ave., St. Louis; 4. Parts Division, Chrysler Corp., Detroit 31.

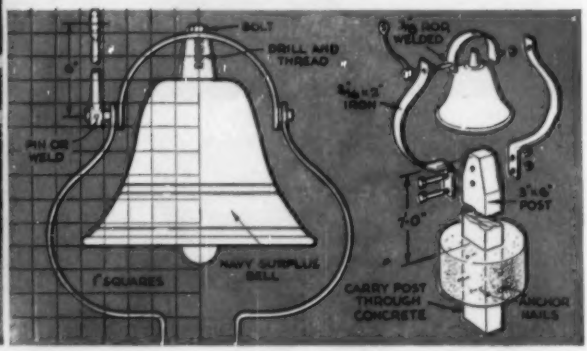
Ship's Bell Decorating Gate Calls Family to Meals

MOUNTING a ship's bell, available as Navy surplus, for use as a gateway ornament offers no problem. One distinctive way is by a strap-iron frame bolted to a post anchored in concrete. Painted flat black, the frame will have the appearance of wrought iron.

The yoke and mounting-frame sides can be bent to shape in a heavy vise. If you wait to cut the pieces to length until after shaping, you may have sufficient leverage to complete the job without a hammer.

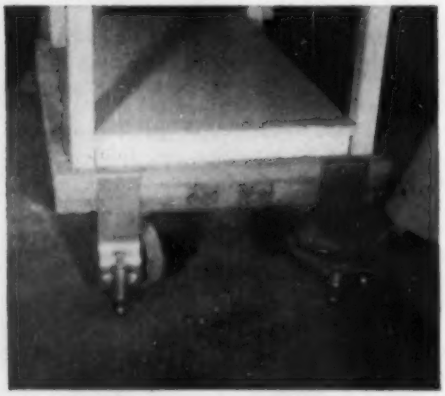
An S-handle socket wrench, or a discarded lug wrench, makes an excellent handle for the bell cord, or you can saw one out of ½" iron stock.

The bell is not only ornamental but will be a convenience in summoning the family (including four-footed members) to meals.—*Hi Sibley, Nuevo, Calif.*



Wax Holds Screw in Position

BEESWAX rubbed in the slotted head will hold a screw on the screwdriver blade when you are starting threads in a hard-to-reach place. Floor, furniture and other waxes will do if they are tacky.—*Walter E. Burton, Akron, Ohio.*

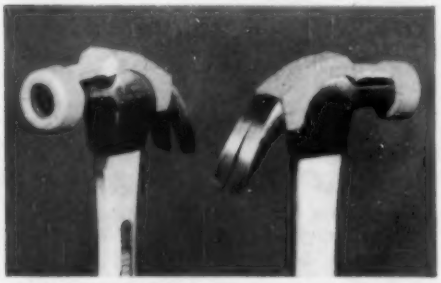


Door Holders Stop Casters

CASTERS on power-tool stands are a great boon but difficult to keep from moving about. I met this problem by screwing step-on door holders to the bottom of the stand near each wheel.—*Arthur R. Tanner Jr., Cold Spring, N.Y.*

New Tools

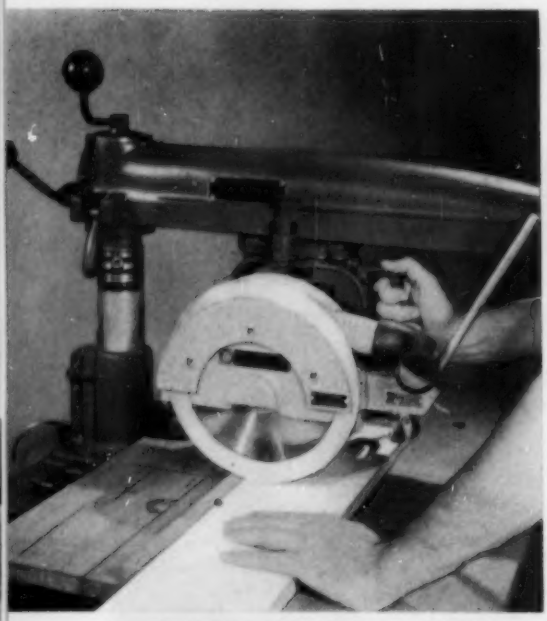
1. Vise Bends Metal. By adding attachments to this swivel-base vise, you can quickly form light metal into all sorts of fancy and intricate shapes. To curve flat stock (above right), three spools are slipped into holes in the vise jaws and the metal rolled between them by cranking the outer spool. With a breaking wedge in place of one spool (bottom left), you can make sharp bends by closing the vise against the stock. A set of grooved spools handles rod and tubing. To bend sheet stock (top left), two right-angle bars are slipped over the jaws and the metal squeezed between them. An electric-drill stand can also be mounted in the hole at the rear of the vise.



2. Guard Cushions Hammer. This rubber hammer guard lets you drive nails without marring delicate surfaces. The part that extends up to the claw protects fine finishes when the hammer is used as a nail puller and also saves breakage of porcelain and tile if the hammer is accidentally dropped. The guard slips easily onto most 16-ounce hammers.

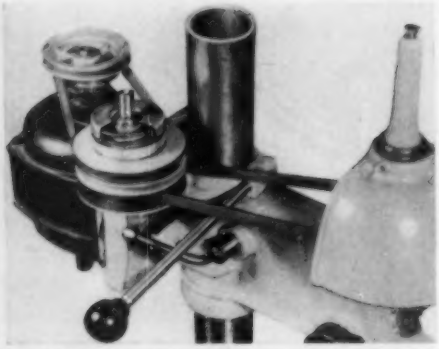
3. Pocket Tester Checks Circuits. Two small pen-type batteries power this electrical continuity tester that can be carried as easily as a pencil. It has a probe tip at one end and a bulb at the other that lights when a circuit is completed. It can be used to test fuses, locate shorts and broken wires, and to distinguish between any two leads in a cable with the house current turned off.

Please turn the page for more new tools

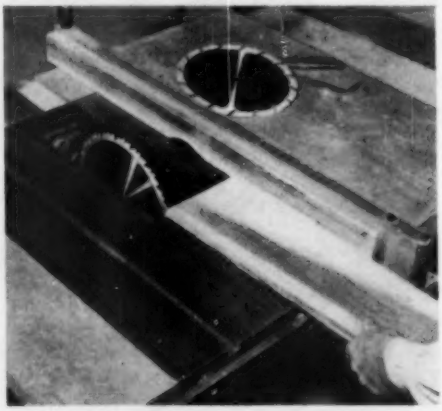


5. Blade Guard Adjusts to Work. No matter how you tilt this radial-arm blade, a new guard automatically conforms to the angle, riding up as the cut is started and down at the end. Two rings, one on either side, completely enclose the lower half of the blade. Loosely suspended, they follow the work independently, even on difficult cuts such as compound miters. The guard comes in 9", 10" and 12" sizes.

6. Sandpaper Polishes Lacquer. You can put a really sleek finish on wood and metal with this superfine sandpaper. Two new grits, 500-A and 600-A, the finest ever made in this type of abrasive, are especially designed for wet-sanding of lacquer finishes. The silicon carbide paper is chemically treated to shed water so that it can't become soggy during use, and because it has the tough, leathery texture of coarser grades it withstands wear and flexing.



4. Variable Drive Fits Drill Press. You can get practically any drill speed you want with this variable drive that slips over any standard 2¾" drill-press column. One half of a sliding pulley is belted to the motor and the other half to the spindle. A lever pivots the drive around the column, forcing the sliding flange to move up or down to change the speed of the spindle in a continuously variable ratio.



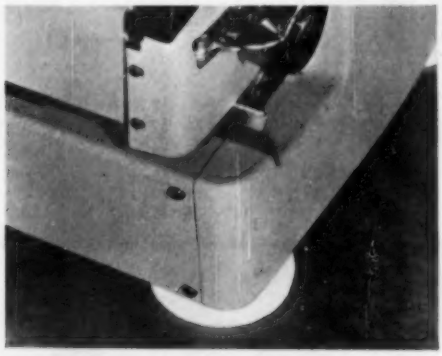
7. Tougher Teeth Last Longer. Just as auto pistons have been chrome-plated to increase toughness, these new chromium-tipped saw blades are said to last four times as long as ordinary blades. The chromium also lowers friction, cuts faster, runs cooler and reduces the need for sharpening. The blades are available in all standard sizes, arbored to fit most table, radial-arm and portable saws.

Further information about the tools described on this and the preceding page can be obtained from: 1. Swayne, Robinson & Co., Richmond, Ind.; 2. Highland Industries, Moosehead Lake Highlands, Greenville, Maine; 3. Burnworth Tester, 815 Pomona Ave., El Cerrito, Calif.; 4. Speed Selector, Inc., 118 Noble Court, Cleveland 13; 5. De Walt, Inc., 3046 Fountain Ave., Lancaster, Pa.; 6. Behr-Manning Corp., 1933 Sidford St., Troy, N.Y.; 7. Price & Rutzebeck, P.O. Box 30, Hayward, Calif.

Brush Sweeps Records Clean

You can put a broom on the end of your record-player arm that will automatically remove the fine dust from the tiny sound grooves as the records are played, improving tone and reducing wear on the needle.

Get a No. 2 or No. 4 camel's-hair brush, available for a few cents at any art-supply store. Saw off the brush about ¼" from the end of the ferrule and mount it on the arm ahead of the needle. Test it first with adhesive tape to be sure it doesn't interfere with tracking, then glue it in place.—*S. R. Williams, Los Angeles.*



Powder Puffs Quiet Typewriter

A SPONGE-RUBBER powder puff under each foot of a portable typewriter will do a lot to muffle the sound when you type late at night.—*Frank A. Javor, North Bergen, N. J.*

Mailbox Shows Up at Night

A RURAL mailbox won't get bumped into at night by cars turning in the driveway if you outline the edges with reflective-type tape. You can get the tape at auto-supply stores or from mail-order houses.—*Jack Brian, Jackson Heights, N. Y.*

An Easy Way to Make "Bricks"

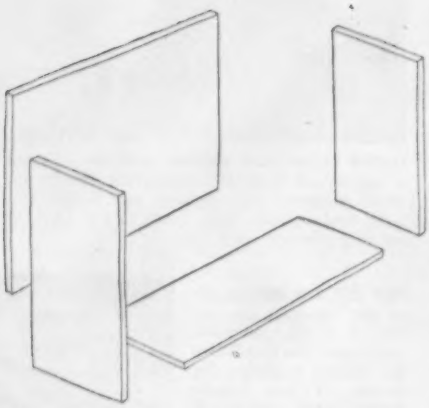
USING CIGAR-BOX MOLDS, you can turn out a supply of decorative concrete blocks for small masonry jobs around your home. Mix sand and cement, three parts to one part, or use the ready-mixed type.

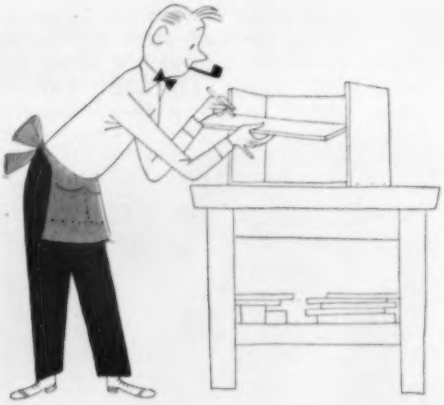
PRY OFF THE BOXES after the concrete has set for a week. Remove with care; the boxes can be bound together for re-use. A few blocks made each week in winter will give you enough by summer for a flower-bed border.

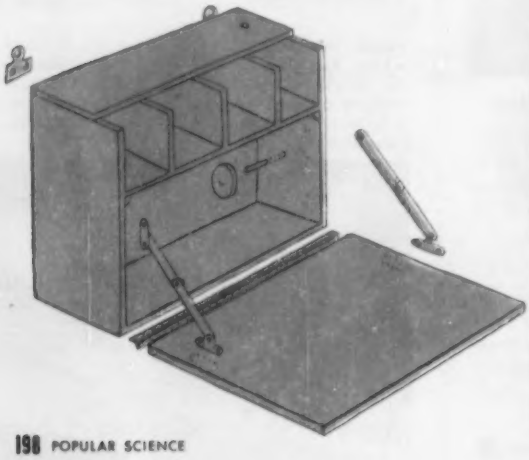
PAINT THE BLOCKS red, stripe them with white, and they'll look like bricks. Because the blocks are wide, a low wall will stand without mortar. Or set them in sand to pave a terrace or garden path.—*Denis Hoffman, Los Angeles.*

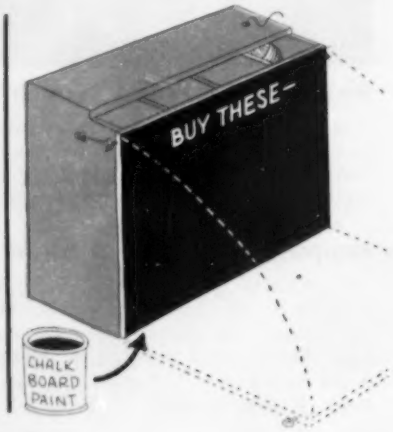
By Roy Doty

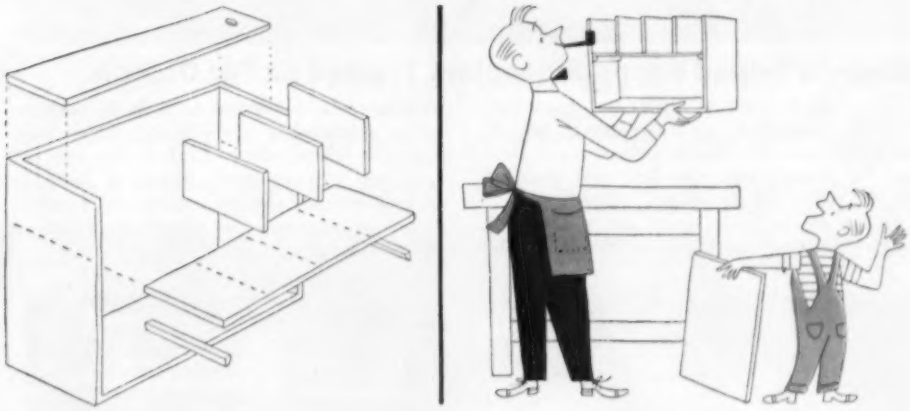
Wordless Workshop

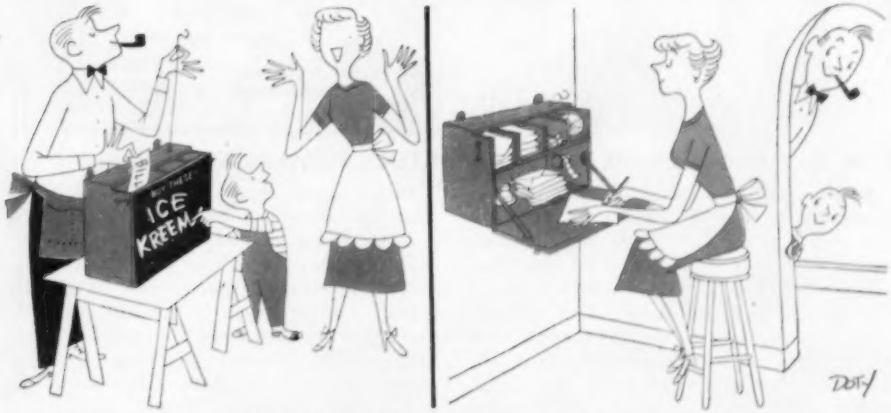




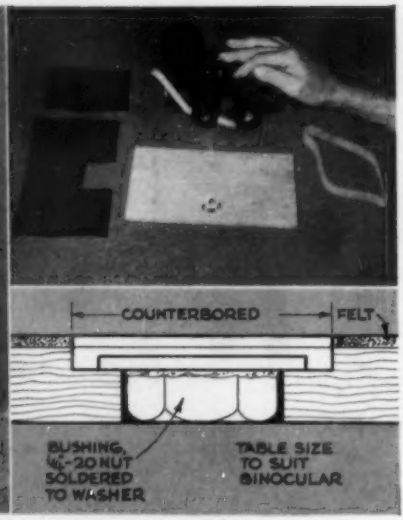








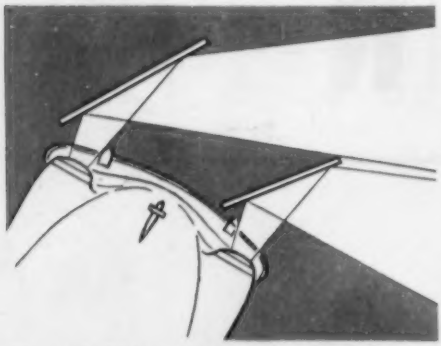
Next Month: A portable rack to keep magazines neatly stored



Camera Tripod Keeps Binoculars Trained on Far Objects

It's easy to keep an object in view if you mount binoculars on a camera tripod. Strapped on with a heavy rubber band, they can be panned over the field and steadied at any point for prolonged study.

From any suitable board saw out a table slightly longer than the breadth of the binoculars, and countersink a hole to take a washer soldered to a ¼"-20 nut which engages the tripod screw. Cement the nut in place and cement small pieces of felt on top as a rest for the binoculars and on the bottom to cushion the tripod panhead.—*Ivan Grosvenor, Indian Rocks, Fla.*



Boards Aim Headlight Beam

A rancher accustomed to using his car headlights as a night trouble light found he couldn't maneuver at one place to put the beam on a fence that needed mending.

He solved the problem with two pieces of whitewashed board placed at an angle to deflect the light, fastening them with wire looped in the grille at bottom and taped to the fender at top.—*Charles L. Anderson, Burlingame, Calif.*

Stairs Provide Shelf Space

With a little scrap lumber you can turn waste space under a stairway into a convenient set of storage shelves.

First clean out the litter that always clutters these unused spaces, and then nail cleats to the stringers at the edge of each riser. Saw out shelves of any suitable scrap stock (one-by-tens make good, wide shelves) and nail them to the cleats.—*Charles Adams, Fayetteville, Ark.*

You can save half the cost by

Installing a Car Radio Yourself

By Howard G. McEntee

MUCH as I like music on the road, I balked at the price my car dealer wanted to tack on for a radio. Turned out I was right, too—for a little shopping around and a couple of hours' work I have a radio for about half that figure.

It works fine, and the installation wasn't much harder than attaching a rear-view mirror. I never even looked at the vacuum tubes. The single adjustment necessary was done strictly by ear. Anybody willing to get under the dash can do the same.

Choosing a set. If yours is a popular car, you can get a custom-styled radio to fit it for about $40. Universal sets that fit under the dash of any car cost the same or even a bit less.

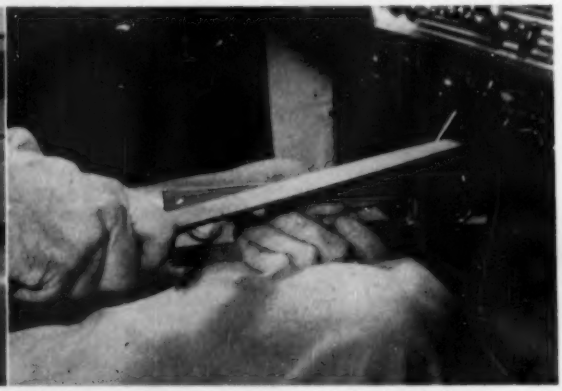
My set was the lowest-priced model of a well-known make; it cost $35. A

YOU DON'T HAVE TO ADOPT THIS POSITION for the job, but the author insists it's most comfortable way to get back of dash on modern cars. Here he loosens cover over radio cutout.

1 RADIO KIT I BOUGHT included the set (with built-in speaker), all mounting hardware and two suppressors. The dial plate (shown in foreground above) and antenna were extra items, but cost only about $3.

2 UNDER-DASH MOUNTING, like this, is easiest, and still leaves ample knee room. The long angle bracket (arrow) can be attached in different ways. But I preferred behind-dash mounting described hereafter.

5 SECOND BRACKET holding set to dash is mounted inside firewall with a long bolt. I ducked drilling a hole by removing an insulation-retaining button. Nut and lock washer go on engine side. Tighten firmly.



6 DIAL PLATE covers oversize hole in dash made for push-button set. As plate was wide, edges were trimmed with snips and filed smooth. It goes behind or in front of dash. To avoid vibration, I bent plate slightly.

trim plate to cover the oversize radio cutout in the dash was $1.30 and an antenna $2. A bigger model of the same make, with push-button tuning, a larger speaker and variable tone control would have cost $46.

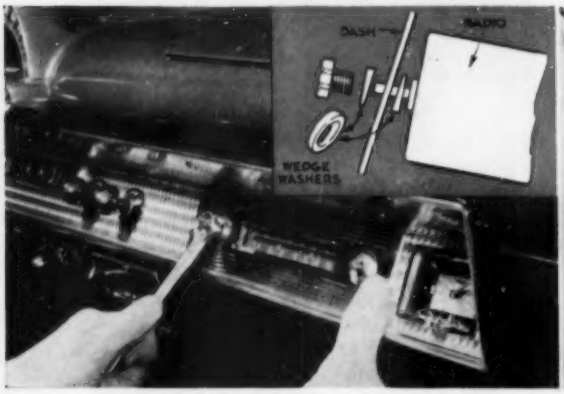
Antennas range from simple manual push-ups to motorized rigs, but the cheap one I used pulls in as much as a de luxe job would. I was careful, however, to pick an antenna that could be mounted from outside the car body. On some modern cars, it's next to impossible to insert one from beneath.

Mounting the radio. Late-model cars have dash cutouts for a dealer-installed set. The custom trim plate adapts this hole to the radio you buy. If your car has no radio cutout, you may find it easier to mount the set under the dash rather than behind it. A long bracket is supplied for this, and you need only drill two holes in the dash flange. Be sure to install the firewall brace, which supports the back of the chassis.

In mounting the set, make certain there is good metal-to-metal contact somewhere between it and the dash. This "ground" contact is one leg of the power supply, and unless it is properly

3 WITH CUTOUT EXPOSED, holes in the dash proved a bit too close together for tuning and switch shafts on the set. A round file soon made them fit. Ash tray under cutout was removed during installation on this 1954 Ford.

4 BRACKET FOR BRACE has to be mounted on back of the radio case with two of the self-tapping screws provided. The holes are already there, so it's a screwdriver job. Strap holds it to a similar bracket on dash.



7 TRIAL MOUNTING showed radio hit ash-tray frame. To tilt it, I cut four wedge washers from tubing. Two were cemented to radio to hold them during installation. Box wrench is best; it won't mar dash surfaces.

8 BOLTING BRACE to bracket on radio case completes installation of the set itself. Perforated strap comes extra long. I snipped it to length that made it draw up back of case slightly to allow enough space for ash tray.

made, your radio will be without juice.

The other leg of the power circuit is a one-conductor cable that must be connected to the "hot" or ungrounded side of the battery circuit. Since the set has its own on-off switch, this lead can go to the heater switch, cigarette lighter, battery side of the light switch or any other live terminal.

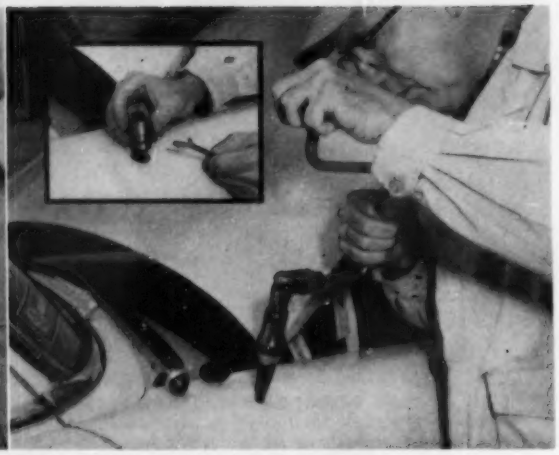
The preferred spot, however, is the "dead" side of the ignition switch—the terminal that is hot only when the ignition is turned on. This will insure having the radio off when you shut the engine off and prevent an unintended all-night drain on your battery that might cause starting trouble the next morning.

On some cars, the switch has an alternate key position in which the ignition is off but gauges and accessories are on. If you connect to this terminal, you can use the radio when the engine is not running, and still be certain the radio will be off when you take out the key.

One way to locate a live terminal is to turn on the radio and hold the power cable to various terminals until the set comes to life. Remember to give the tubes time to warm up.

Cutting out noise. Low-priced radios

9 BEFORE DRILLING for the antenna, I made certain its lead would reach set from this point, and that I could reach beneath to put on the insulator nut. The spot was punch-marked and a small drill started with great care (love that paint job!). Then the hole was enlarged with a ¼" drill.



10 A CONE REAMER in a hand brace would make the ⅞" hole required, or it could be filed out. But having a chassis punch, I reamed the hole only to ⅜" to take the bolt that draws the punch through. This tool (inset) makes quick work of cutting a clean ⅞" hole that is free of any burrs.

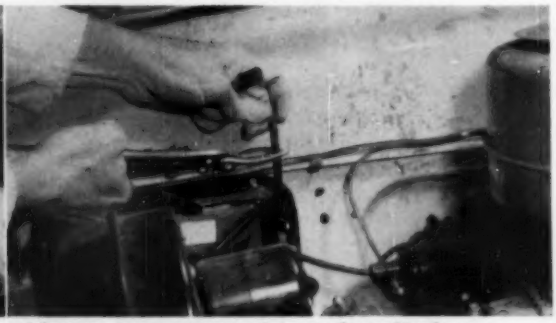
usually come with only two suppressors —a resistor to go into the high-tension circuit, and a condenser for the generator. On my 1954 Ford these proved adequate to hold down noise, even on weak stations.

Some older cars may require a resistor at each spark plug. If you're planning to buy new plugs anyway, you can kill two birds with one stone by buying the resistor type, which have the unit you need already built in. Though built to make the engine run better and plugs last longer, they will also suppress ignition noises in your radio.

One reason for interference may be that the engine hood is not well grounded. This permits engine static to reach the antenna. You can probably kill it by attaching a spring-bronze grounding strap (available ready-made) on the rear of the hood at the antenna side.

Some dashboard gauges may cause snapping noises; suppressor condensers

12 SPADE TIP on the power lead from the set is best connected to the keyed or "dead" side of the ignition switch. This insures that the radio is turned off when the car is left locked. However, if more convenient, the power lead could be run to the cigarette lighter, heater switch or any other live terminal.



13 HIGH-TENSION LEAD from coil to distributor is pulled out of latter and cut 1½" short. Without stripping, long end is pushed into suppressor and twisted clockwise. Cut end of short piece goes into other end of suppressor, terminal end back into distributor. Final job is mounting generator suppressor.

11 WITH CABLE AFFIXED to the inside end, antenna is dropped into place, and the lock nut inserted from beneath and tightened. Ball joint permits some vertical adjustment (above). Some antennas must be put in from below. The other end of cable (at right) is plugged into antenna socket on radio.

at the sending end (such as the gauge terminal on the gas tank) will quiet them. Front wheels, being partially insulated by bearing grease, may also be offenders. You can buy springlike gadgets that will ground them reliably. If the voltage regulator or electric clock causes annoying clicks, condensers will tame them, too.

Most noise from these sources will be audible only when the receiver is tuned between stations, and unnoticeable during a program. Try reception with the suppressors provided; you may not need any others.

Tune your antenna. Your last job, once the set is playing, is to tune the antenna circuit. With the antenna extended to full length, tune in a weak station at the high-frequency end of the dial. Then turn the trimmer screw (usually near the antenna jack on the set) one way or the other to obtain the loudest reception with the least background hiss to interfere. END

ALMANAC
FOR MOTORISTS

Pithy proverbs, provident counsel and omens and portents of interest to horseless-carriage operators.

▶▶**One of life's** persistent puzzlements is why women find it so hard to keep gasoline in a car. Most of them don't even seem to *see* the gauge until the pointer begins nudging the pin by Empty.

▶▶**Speaking of filling the tank,** if you keep the gas tank mostly full there'll be less moisture condensing on the inner tank walls these mornings, and less water to be trapped by the fuel system.

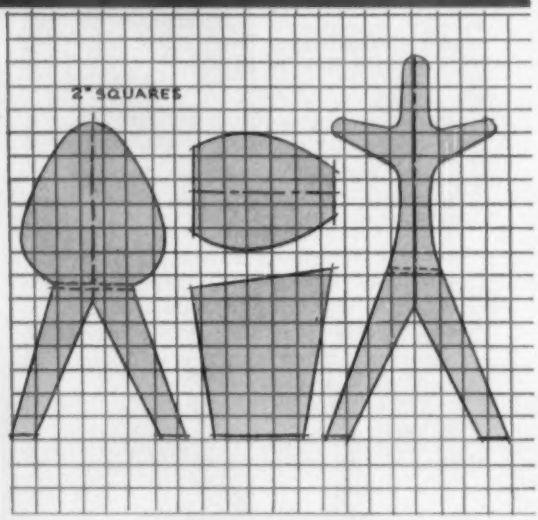
▶▶**Restraint** is the word if, with oilcan in hand, your eye lights on the oil cups on the distributor, generator and water pump. Sure they're there to be used, but just a few drops will do the trick.

▶▶**Engine getting cantankerous** on cold starts? Before you begin working on the automatic choke, ponder how long it has been since the plugs were cleaned and gapped. On many engines, poor plugs insure poor starts.

▶▶**Beware those spooks** who drive serenely along with a turn signal winking away forgotten. Give them a wide berth: they may be wholly unconscious.

Watching TV from

Can't shoo the youngsters out of your favorite chair? Mount them on this seat and they'll stick tighter'n a cinch strap.



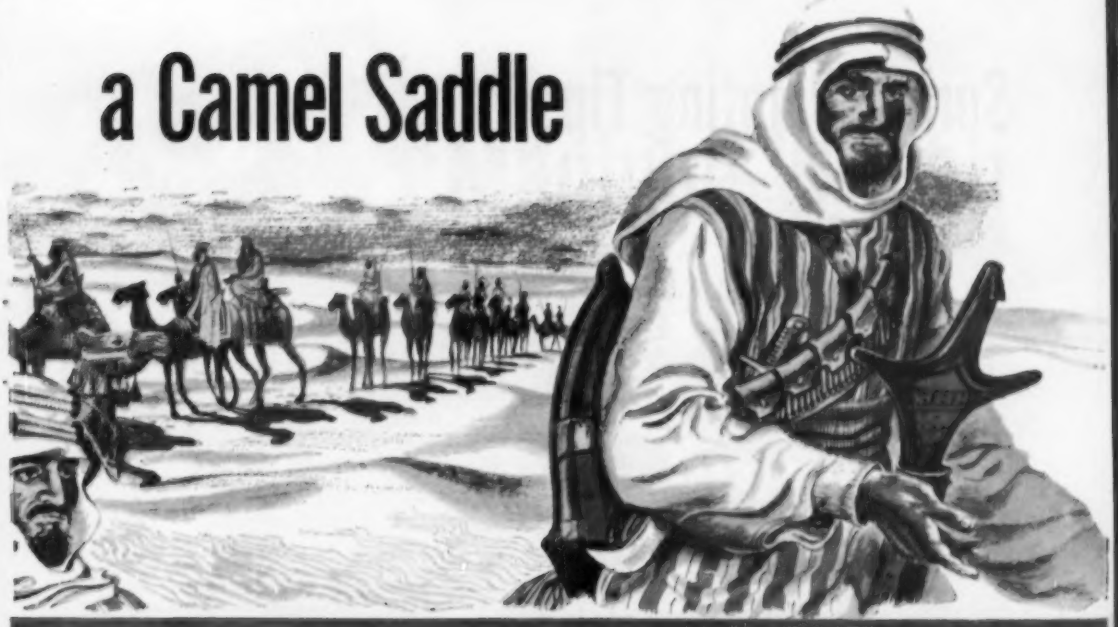
OWNERS of camel saddles say they're the best seats ever designed for TV viewing. They're also among the most expensive—$100 or more for a second-hand, compatible contour job.

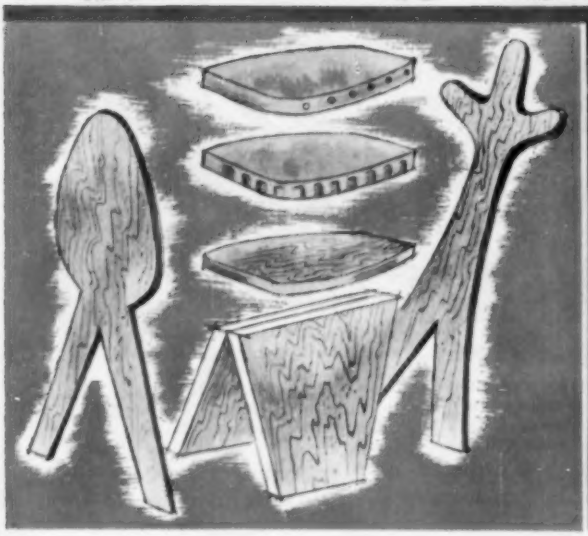
Don't let that throw you. You can still give every junior video fan in your family the thrill of riding herd with Hopalong on his own distinctive camel-saddle seat, a modern version of a centuries-old design. All it will set you back is the price of a sheet of plywood, a bit of foam rubber and a few strips of plastic leatherette.

You'll soon be repaid in full for that small investment. For once the youngsters have straddled the high-backed rigs they'll never crowd you out of your favorite Morris chair again.

They may, however, put you on the spot by wanting to know why the Arabs use cross-shaped saddle horns. Don't tell them the old story about the Crusaders who lost their way in the desert, intermarried with nomadic tribes, and left this symbol of their faith. It's a good yarn but the experts say it isn't so. Instead, assume a knowing grin and wait. Inside five minutes every young camel-saddle rider will have his arms draped comfortably over the pommel crossarms. That's what they were designed for, nobody knows how many years ago.

a Camel Saddle





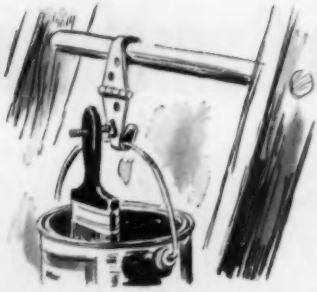
To make a modified camel-saddle seat, scale up the four patterns above, allowing 2″ for each square, and cut the five parts (you'll need two seat-supporting sides) from ¾″ plywood. Assemble them with glue and brads, let set, and then round off all edges with a wood rasp and sandpaper.

Use walnut or mahogany stain to give the wood the color of old saddle leather. Rub a little umber along the edges, then cover the stain with shellac and buff the hardened surfaces down to a satin-smooth finish with steel wool. Edge the pommel with gold paint, if you like.

Finally, upholster the seat and back rest with foam rubber and plastic leatherette of a color suited to your television room. Use large antique-brass upholstery tacks.

Spring Painting Tips

A CUT-DOWN TOBACCO TIN, slotted to fit the ferrule, catches drippings when you paint a ceiling. For a permanent ceiling brush, solder to the ferrule with quick strokes to avoid bristle damage by heat. Inverting the brush flows paint back onto bristles.



AN OLD STRAP HINGE with the ends bent to fit around a ladder rung and under the bucket bail will keep your paint and brush close at hand. A long threaded bolt through one of the hinge holes makes a hanger that will allow the brush to drip back into the pail.

PAINTING IN GNAT SEASON can be a pleasure if you mix a teaspoonful of citronella to the gallon of your outside paint. Insects avoid it while it is drying.

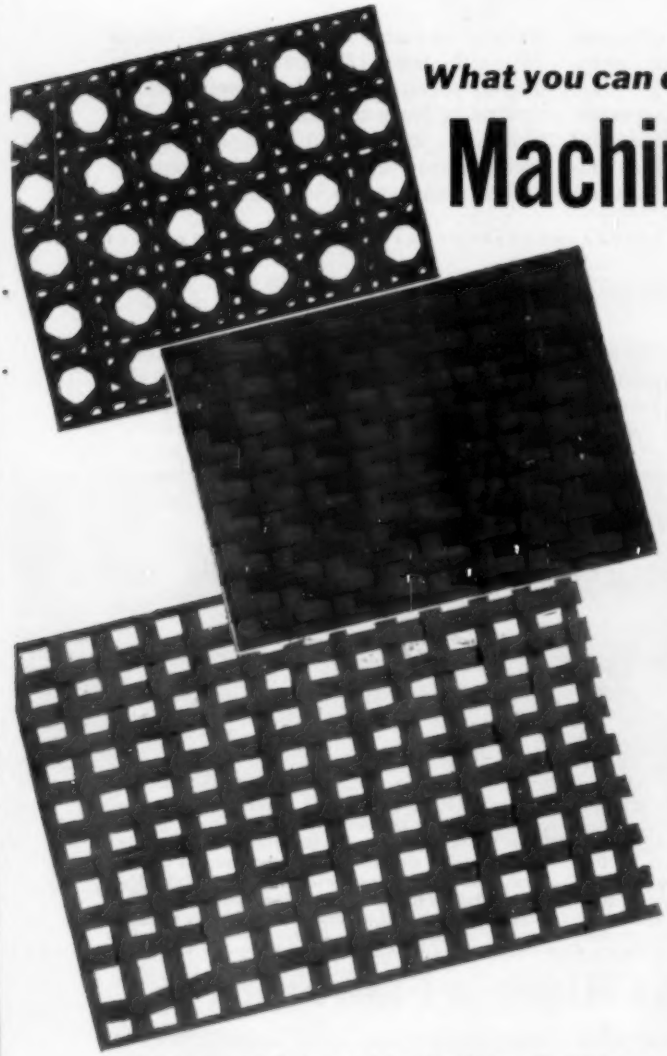
SEVERAL BALL BEARINGS in the paint cup of a spray gun will keep metallic paint well stirred up. Be sure to use bearings larger than the opening of the gun's suction tube.

YOU CAN CLEAN ROLLER quickly in a disposable milk container. Cut through three sides of the top, half-fill with solvent, drop the roller in, close the top and shake. Roll it on newspapers to dry.

FILMING OVER OF PAINT in a partially used can may be prevented by a kraft-paper disk dropped on the surface to seal off air that is present when you replace the lid.

UNCLEANED BRUSHES remain pliable when suspended to just below the ferrule in a cheap-grade motor oil or crankcase drainings. You simply press out the oil and clean with turpentine or other solvent when ready to use.

A DROP-LEAF EXTENSION will provide firmer footing when you work from the top of a step-ladder. It also gives room for the paint can.



What you can do with

Machine-Woven Cane

Screen hi-fi phono equipment

Dress up that old lamp shade

Restore antique furniture

Modern designers are finding dozens of new uses for one of the world's oldest types of chair covering. You can, too.

WOVEN cane, the light, tough stuff that brought air conditioning to Grandma's summer furniture, has bounced back into the modern home. Decorators are drumheading it over everything in sight: screens and valances, hi-fi speaker grilles, radiator covers, picture mats, plant holders and table novelties. They're even plugging it as a brand-new chair-covering material!

You can get into the caning act yourself with no

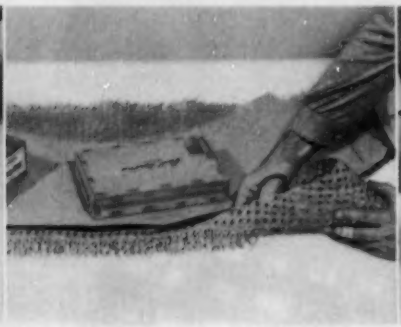
more equipment than a pair of scissors, a tub of water, a tack hammer or a stapling gun, and a pot of glue.

You don't have to be a basketmaker. Scores of retail upholstery stores and mail-order supply houses now offer machine-woven cane webbing in a wide variety of handsome designs. It comes in widths from 12″ to 48″, and you can buy as much or as little as you need.

Caning looks most modern when it is skillfully combined with wood or wrought-iron framing. In a complete switch from period-furniture design, the

New Lamp Shades from Old

So JUNIOR finally sailed his Yo-yo through the old parchment-covered lamp shade at the far end of the parlor. Throw the Yo-yo away, if you like, but not the shade. You can make it better than new with open-weave caning. Here's how:



LAY SHADE ON ITS SIDE and use it as a guide to make a paper pattern. A 1″ overhang at top and bottom will allow for tailored trimming after the webbing has been attached to the frame. Now soak the cane in cold water for 15 minutes and shake out well. Weight the pattern down on the webbing and cut the cane to size. (If the tear in the parchment can't be closed, use the pattern first to cut a new paper liner.) Tie the cane to the frame with string or fine cane strands. If a new liner is being used, punch aligning holes and lace both materials to the frame at the same time. Glue the overlapping ends and, finally, trim edges to size.

This Cane Jacket Hides a Flowerpot

HERE's a quicky—a close-woven cane sheath to hide an unsightly flowerpot. You can turn out half a dozen of them in an evening from a few remnants of webbing, some cheap pine shelving and a handful of upholstery nails. If you want to add a bit of color, bind the top with gum-backed fabric tape.

TURN THE BASE for the holder from pine. Slightly tapered, its diameter should be about 1″ larger than the bottom of the pot. Tack caning to the base with upholstery nails. Force a few loops of twine through the lapping vertical edges of the cane and tie firmly from the inside. Then trim the top edge.

object nowadays often is to make the webbing dominate the frame. Bear this in mind when styling any cane project.

Don't worry about your ability to tame the stiff and springy webbing. Even on surfaces with tricky contours, water will take the fight out of the cane long enough for you to anchor it down. When the wiry strands dry again, they draw as taut as circus high wires, giving your handiwork a smooth, professional look that will last for years.

Please turn the page for more about how to use cane

Airy Panels Enclose Hi-Fi Equipment

FRAMING a picture window, cane paneling spreads its airy lightness across an entire wall. In this living room it does more than that. Hidden behind the paneled doors are a hi-fi amplifier and speakers, a turntable and tape recorder, and plenty of room for record shelves. Note what an inconspicuous part the wood framing and hardware play. You can build a similar cabinet assembly, tailored to your own needs. The three simple caning steps are shown in the photos below. Tacks can be substituted for staples.

SELECT WEBBING with a semi-open weave so it will not dampen speaker sound. With scissors or tin shears, cut out a section slightly smaller than the outside dimensions of the frame.

SOAK THE WEBBING in cold water for 15 minutes to make it pliant. The cane will expand at the same time, insuring a drumhead fit when it dries again. Wipe off excess water for a good glue bond.

APPLY GLUE to the back of the frame. Lay cane on glued surface, shiny face down. Staple one short edge, pull tight and staple the opposite edge. Then staple the long edges, maintaining even tension.

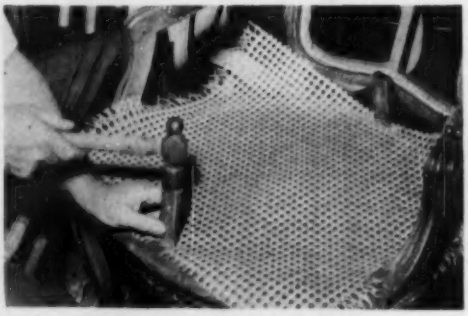
More Handy Uses for Cane Webbing

COOL CANE SEAT for summer driving doubles as a beach or picnic chair. Make the framework of plywood or pine, hinging it for storage. Slots in the side-frame members let air circulate freely and also serve as carrying handles. Use open-weave cane, soaking it first, and staple or tack it down. Cover the edges with fabric tape of a color that matches your car's upholstery.

CANED VALANCE lets sunlight through. Connect top and bottom frames with spacer strips. Back caning with thin fabric.

FAVORITE PRINTS can be attractively matted with the close-weave types of caning. Use glass to keep dust from gathering on hard-to-clean, rough surface.

1 STRIP OFF THE OLD CANING and clean the frame, removing dried-out glue and protruding splinters. Use a screwdriver to clean out the thin slot that runs completely around the frame at the inner edge of the rabbet.



2 CUT A RECTANGLE OF WEBBING somewhat larger than the area to be caned, soak it and stake it down at the back edge with a wooden wedge driven into the chair slot. Pull cane tight at the front edge and stake it down the same way.

3 REMOVE THE FRONT WEDGE and use it to force the cane into the slot all around the chair. Note that rear wedge is used as an anchor point during this whole operation. Now trim away excess caning projecting from the slot.

Recaning An Antique Chair

THERE's often a chair in the attic that would be as good as new if it were recaned. If your taste runs to period furniture, like the French chair at right, look around you for such a relic. With open-weave webbing you'll have no trouble putting it back into shape for years of gracious service. Here, an expert who's been doing it for 40 years shows you how. Believe it or not, the whole job took him only 18 minutes! Don't attempt to beat his record on your first try.

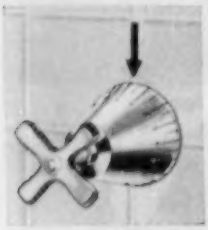
4 CANING IS ALREADY TAUT—it could probably carry your weight at this point. But two more steps are needed to hold it permanently. The first is a generous bead of ordinary glue, applied here with a handy applicator bottle, along the line of the chair slot.

5 IMMEDIATELY AFTER GLUING, pound a spline (a long strip of square-cross-section cane) into the slot. Wipe off excess glue with a damp rag and check again for bits of ragged cane, trimming with a sharp knife. Back of the chair is caned just like the seat. END

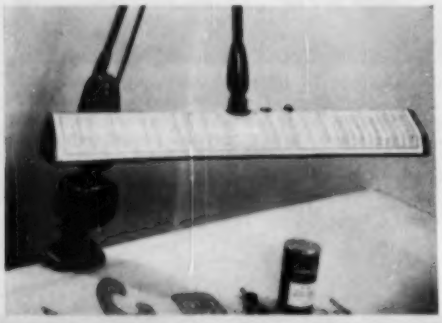
1. Step Fits Ladder. You get more standing area and less aching of feet with this aluminum clip-on ladder step. The side brackets automatically adjust to standard ladder sizes and are locked tight by the pressure of your weight on the step. The step can be quickly moved from one rung to another as you work your way up or down. There are no nuts, bolts or other fastenings to loosen.

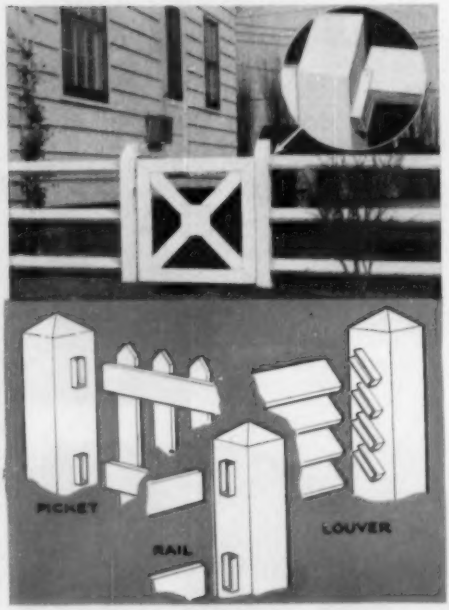
New for the Handy Man

2. Dials Set Bath Temperature. Once you've set your faucets to the desired temperature, you can turn to the same temperature every time with these numbered dials. The plastic dials are slipped over any standard valve stems by simply removing the faucet handles. Self-adhesive arrows are pasted to the wall above them so you can turn quickly to the correct numbers.



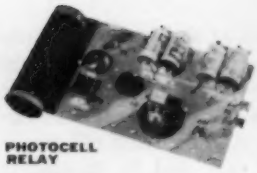
3. Labels Give Workshop Data. A glance at these tables shows you which drill bits to use for tapping, decimal equivalents, and gauge sizes for wire, tubing and sheet metal. The label has a self-adhesive back that will stick to a fluorescent lamp, worktable, or toolbox cover.





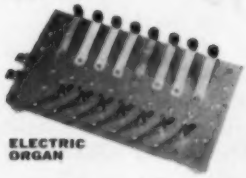
4. Brackets Build Fences. Picket, rail, or louver fences can be built with these open-end aluminum brackets without your having to mortise the posts. Just screw the brackets to the posts and insert cross boards. The brackets can be used vertically or slanted and come in three sizes for one-by-four, one-by-six and two-by-three boards. Rails can be lifted out of the open brackets at any time.

Further information about the products described on this page can be obtained from: 1. Safway Metal Products Co., 1111 Webb Ave., Detroit; 2. Ranch House, P.O. Box 120, Goleta, Calif.; 3. Timber-Top Products, P.O. Box 14, Sherman, Conn.; 4- Casom Industries Inc., 6012 Wayzata Blvd., Minneapolis, 16.



PHOTOCELL RELAY

AUDIO OSCILLATOR



ELECTRIC ORGAN

THESE THREE easily built breadboard rigs make a single inexpensive transistor do a lot. Top unit rings when light strikes it. Code practice rig at center plays tunes when connected to the single-octave keyboard shown below it.

Transistor Hookups That Sing and See

Simple circuits generate tones, make music, even detect light.

By Howard G. McEntee

MYSTERIOUS as they first seem, transistors will perform their wonders in comparatively simple circuits. With an inexpensive photocell, one of these amazing crystals becomes a sensitive electric eye.

In another circuit, it will oscillate at an audible pitch. By hooking a telegraph key to it, you have a good code-practice outfit. Add a keyboard with different condenser-resistor values to this audio oscillator, and you can play tunes on a simple electric organ. The amplifier already described (PSM, Feb. '55, p. 221) can be added to the audio oscillator or organ for modest speaker volume.

Medium-size flashlight cells supply all the power necessary. Be careful to mark the battery cases exactly as shown in the drawings, and to insert cells with their

center (positive) buttons toward the red marks. Reverse polarity may damage the transistor.

With perforated composition board as panel material, you have no drilling to do. If any part does not exactly fit the holes, enlarge or elongate them with a round file.

Only one transistor—an FS2500*, bargain-priced at less than two dollars—is necessary for any of these circuits. Subminiature tube sockets with two prongs removed, as shown on page 217, enable you to change the transistor from one circuit to another. Always shut off power before taking it out, and be careful to insert the transistor with its red dot on the marked side of the socket.

*Transistors and other parts sold by Federated Purchaser, Inc., 66 Dey St., NYC 7.

Transistor Triggers This Robot Eye

SHINE a powerful flashlight into this rig from as much as 35 feet away, and a bell rings. Falling on a tiny photocell, the light generates a minute current. This is instantly amplified by a transistor circuit so that it can work a sensitive relay, which can ring a bell, start a midget motor or actuate a heavier relay for operating larger equipment.

Either of the two relay points can be used, so the light impulse can as readily open a circuit as close one, or the cell can be exposed to a constant beam of light and a local circuit worked when the beam is interrupted.

The self-generating photocell is a little plate with one shiny side. This is the back and constitutes the positive cell terminal. The dark brown face is the light-sensitive side. A silvery strip at one end of it forms the negative terminal.

To keep unwanted outside light from working it, the cell is housed in a piece of mailing tube, being mounted on a wooden disk held in one end with small wood screws. A flat piece of tin is bolted to this piece, and the cell is placed with its bright side on this and held by a small lug bent to form a retaining clip. This must touch only the narrow terminal strip on the brown side—not the edges or any other part of the surface. Paint the tube's inside dull black.

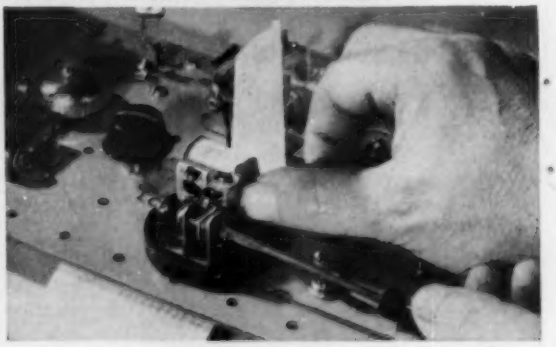
A milliammeter is helpful in setting the sensitivity control and adjusting the relay. If you have one, set the relay contacts so that the armature flips over on a current of about 2 ma. and drops back when current falls to 1.5 ma. Start with the potentiometer at the negative, or low-current, end to start.

The better your transistor, the greater the difference in current when light strikes the cell. The best FS2500 tried gave a change from .2 ma. to 2.5 ma., but most will cause an increase from about .8 ma. to 2.5 ma.

As connected in the diagram, the sensitivity control will bleed about 10 ma. from the battery whenever the switch is on. For stand-by use over long periods, it may be better to provide the necessary photocell bias by a separate 1½-volt cell, with its own on-off switch, connected across a 1,500-ohm sensitivity control.

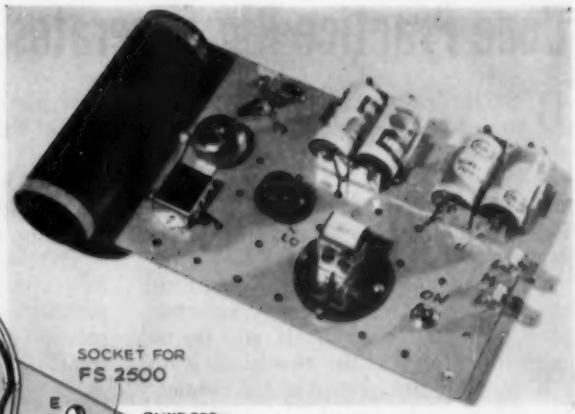
More sensitivity can be obtained by fitting a lens into the photocell barrel to collect light and focus it onto the selenium surface.

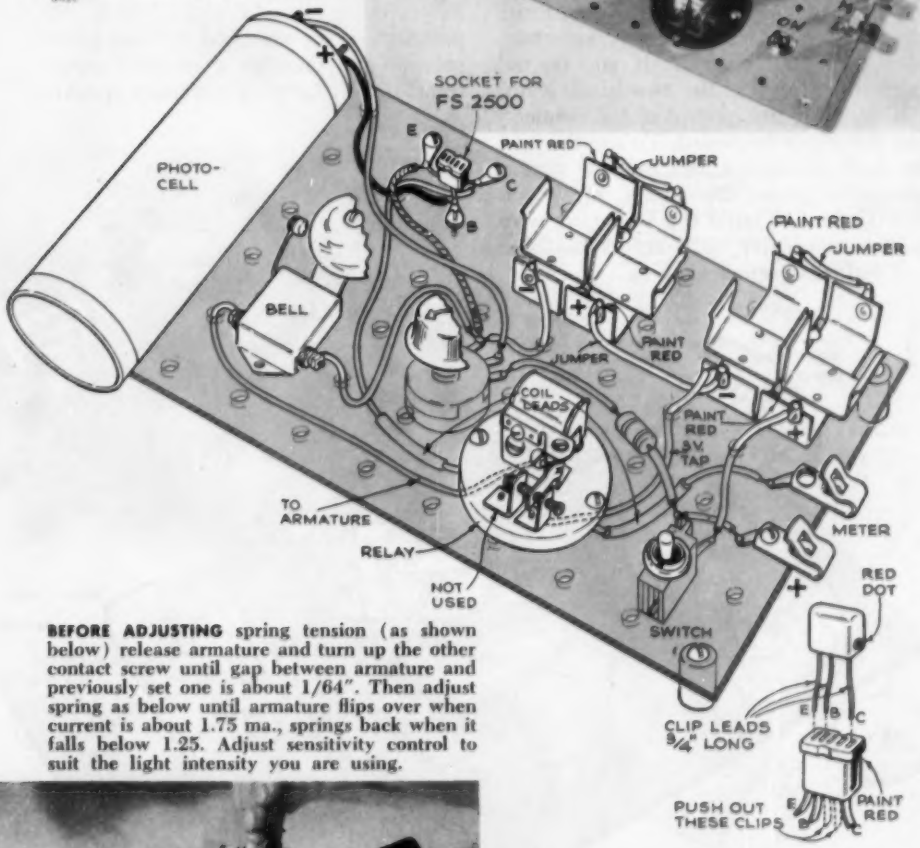
SET UP RELAY CONTACTS. First hold armature against magnet with cigarette paper between. Turn in contact screw that is now held closed until it pushes armature off just enough to let you pull the paper out without tearing it.



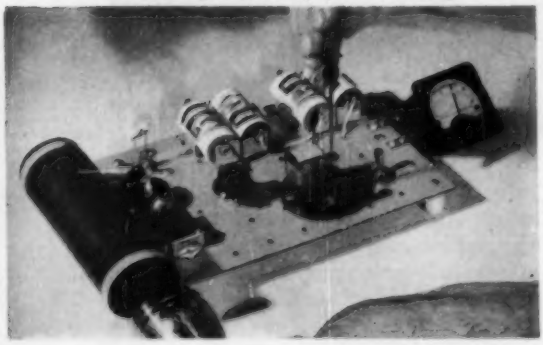
PARTS LIST

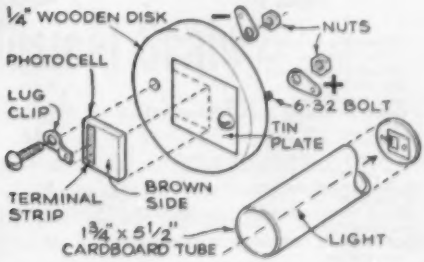
Pcs.	Description
1	self-generating selenium photocell (International Rectifier B-2)
1	2,000-ohm sensitive relay (Sigma)
1	500-ohm potentiometer
1	820-ohm ½-watt carbon resistor
1	5-prong subminiature socket (Cinch 2HS)
1	FS2500 transistor
2	cases for two C cells (Acme No. 10)
4	C flashlight cells
1	small electric bell
1	S.P.S.T. toggle switch
2	No. 2 Fahnstock clips, 17⅝" roundhead 6-32 screws, 13 6-32 nuts, 5 No. 6 lugs, small knob, cardboard photocell housing and wood mount, 6"-by-10" pegboard base





BEFORE ADJUSTING spring tension (as shown below) release armature and turn up the other contact screw until gap between armature and previously set one is about 1/64". Then adjust spring as below until armature flips over when current is about 1.75 ma., springs back when it falls below 1.25. Adjust sensitivity control to suit the light intensity you are using.





Please turn the page for more on transistors

Code Practice Rig Generates Sound

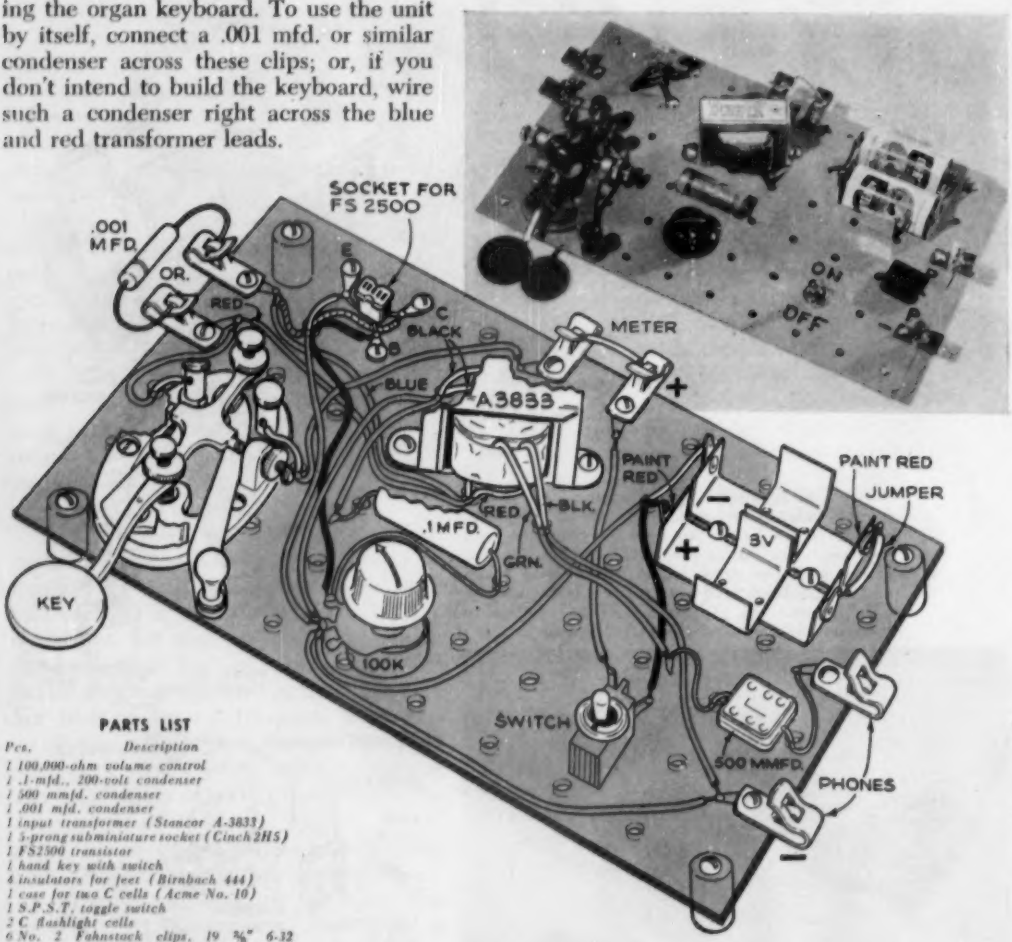
BESIDES providing a realistic "beep" for code practice, this circuit forms the basis for the simple electric organ on the facing page. If you haven't a regular practice key, a simple substitute can be made as shown for the organ keyboard.

The center winding of the transformer must be connected one way, ascertainable by trial and error. If you do not get a tone, reverse the two black leads.

Two clips are provided for connecting the organ keyboard. To use the unit by itself, connect a .001 mfd. or similar condenser across these clips; or, if you don't intend to build the keyboard, wire such a condenser right across the blue and red transformer leads.

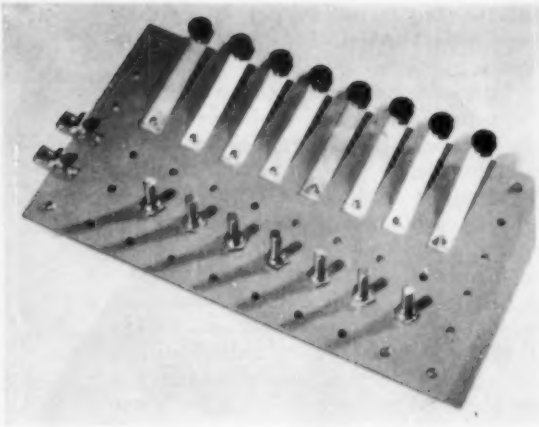
A meter hooked to the meter clips should read between .1 and .3 ma. The current will vary with the potentiometer setting (which in this case adjusts pitch, not volume). If no meter is connected, short the clips with a wire jumper.

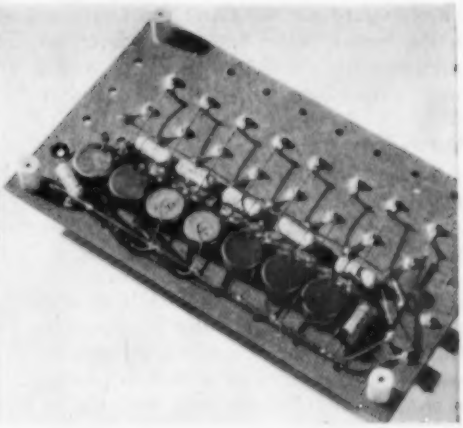
The single-stage amplifier shown in a preceding article (PSM, Feb. '55, p. 220) may be attached to boost phone volume or (through a suitable output transformer) to work a midget speaker.

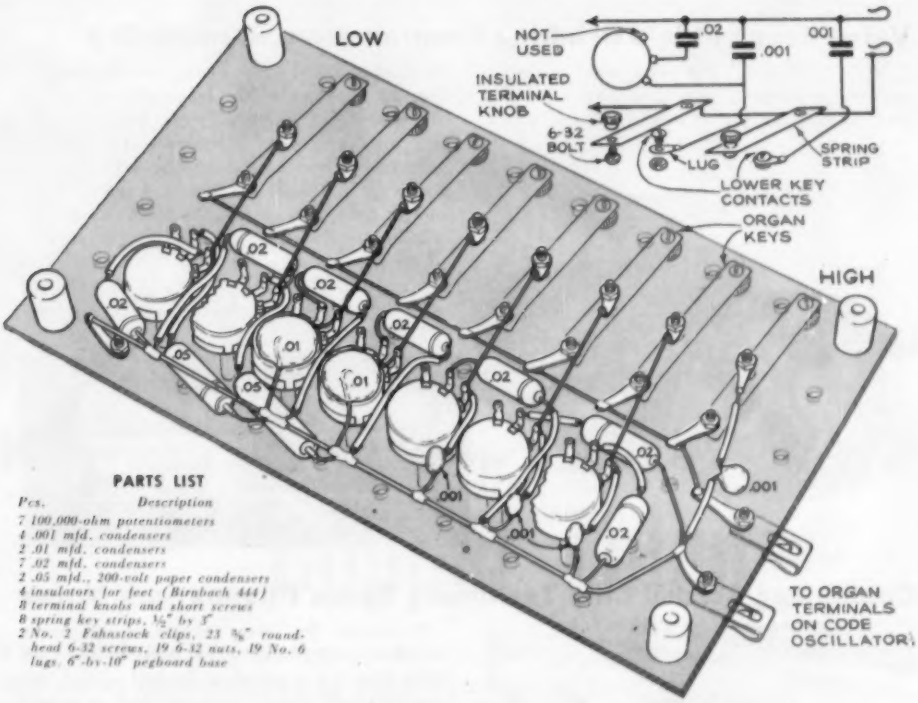


PARTS LIST

Pcs.	Description
1	100,000-ohm volume control
1	.1-mfd., 200-volt condenser
1	500 mmfd. condenser
1	.001 mfd. condenser
1	input transformer (Stancor A-3833)
1	5-prong subminiature socket (Cinch 2HS)
1	FS2500 transistor
1	hand key with switch
4	insulators for feet (Birnbach 444)
1	case for two C cells (Acme No. 10)
1	S.P.S.T. toggle switch
2	C flashlight cells
6	No. 2 Fahnstock clips, 19 ⅜" 6-32 roundhead screws, 15 6-32 nuts, 9 No. 6 lugs, 1 small knob, 6"-by-10" pegboard base, phones







PARTS LIST

Pcs.	*Description*
7	*100,000-ohm potentiometers*
4	*.001 mfd. condensers*
2	*.01 mfd. condensers*
7	*.02 mfd. condensers*
2	*.05 mfd., 200-volt paper condensers*
4	*insulators for feet (Birnbach 444)*
8	*terminal knobs and short screws*
8	*spring key strips, ½" by 3"*
2	*No. 2 Fahnstock clips, 23 ⅜" round-head 6-32 screws, 19 6-32 nuts, 19 No. 6 lugs, 6"-by-10" pegboard base*

This Keyboard Adds a Musical Scale

BY CONNECTING the audio oscillator to a row of keys, each with its own condenser and variable resistor, you can get as many different notes. The resistor enables you to tune the keyboard. With eight keys, you'll have a full octave, enough to play a few simple melodies.

Make the keys of nickel or chrome-plated metal so that oxidation will not affect operation. The lower contacts may be plated roundhead screws.

The condensers specified provide

enough latitude to allow the keyboard to be tuned. Some transistors, however, may require a different range of values, so you may have to try other condensers to get a full scale. Note that the first key, at the right-hand end, has only a condenser in series with it. The second and following keys are all alike circuitwise, with two condensers and a 100,000-ohm potentiometer.

To use the organ, remove the condenser from the organ clips on the code oscillator and connect the keyboard to them with short wires. Short out the code key by closing its switch or placing a weight on the knob, and turn the oscillator control until no note is heard except when the right-hand keyboard contact is closed.

Curiously, most transistors will have to "warm up" a few minutes before settling down to stable oscillation, so wait a few minutes before trying to tune the rig. First adjust pitch of the right-hand key by the oscillator control. Then tune the others down-scale from it, each by its own resistor.

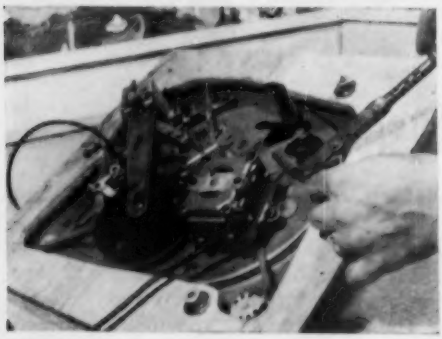
Like some musical instruments, the oscillator organ sounds only one note at a time. By feeding its output into a large amplifier, full room volume can be obtained. END

Valve Keeps Fido's Drinking Fountain from Running Dry

With a float of the type used on evaporative air coolers, you can give your dog an unfailing supply of fresh drinking water.

He'll be grateful when warm weather sets in. Use an aluminum pan large enough to let the float valve operate freely and still provide an unobstructed drinking area. Drill a hole through one end of the pan for the float-valve fitting and use a length of ¼" copper tubing to connect it with a threaded hole in the side of an auxiliary faucet mounted on the line to a sill cock. That way, you can turn off the water at any time and still use the regular faucet.—*George Sittler, Arlington, Tex.*

Condenser Across Line Terminals Stops Phonograph Noise



Annoyed by an unpleasant popping sound coming from your record changer when it switches off after the last record has been played? It's a common fault in many makes of phonographs. You can prevent it effectively simply by soldering a condenser across the line terminals. Use an .05 paper dielectric condenser with a rating of at least 400 volts.

You can also employ the same device on any other musical component, such as an amplifier or preamplifier, without any deterioration of its efficiency or quality.—*S. R. Williams, Los Angeles.*

What you should know about

Copper Tubing

You can bend it with your fingers, make joints in minutes and add many new fixtures to your home with this simple plumbing.

By John Burroughs

UNTIL I tried copper tubing, I never thought I could handle a home plumbing job. Now I've found that you can string this stuff around your house almost as easily as garden hose. Better yet, you come out with a permanent, rustproof plumbing system for both hot and cold lines that's as fine as the fanciest professional jobs.

Adding plumbing for a new bathroom, piping a cellar tub or darkroom sink, or running underground lines to outdoor pools or sprinkling systems are weekend projects requiring only a hacksaw to make a few cuts and a small torch to solder connections together. There's no

How you install copper tubing

YOU CAN EASILY STRING soft-temper, flexible tubing through holes in floor joists or wall studs. Straight hard-temper sections can be notched into edges of beams if code permits, or nailed to face with small pipe straps. Make bends gentle to ease water flow, avoid strain at sharp corners. Soaping outside of pipe first helps you slide it through holes.

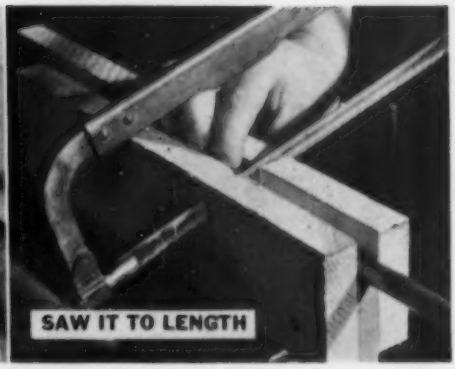
monkeying with Stillsons, threading dies, or pipe vises that you need for galvanized-steel plumbing. In many cases, you can use simple screw-together fittings that eliminate even the job of soldering.

Types of tubing. Enormous presses cold-extrude seamless copper tubing from solid billets of the pure metal. The

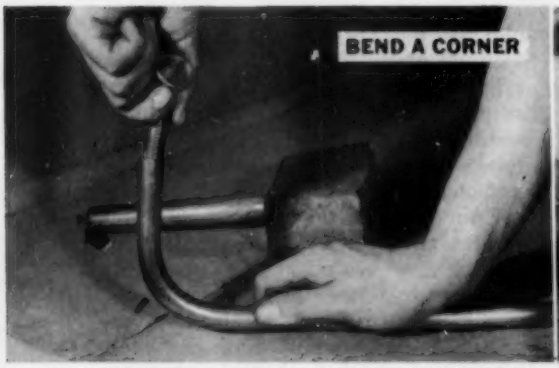
10 ways you can improve your home plumbing with copper pipe

1. Extend a branch water line to supply an added-on bathroom.
2. Replace old radiators with modern baseboard or radiant wall units.
3. Run an underground water line to a garage or other outbuilding.
4. Replace rusted and lime-clogged water lines where pressure has dropped.
5. Install a sink in a basement darkroom or playroom bar.
6. Run a fuel line from an outdoor oil tank (but not gas without an expert).
7. Install a permanent sprinkling system for your lawn.
8. Mount a shower head over a bathtub that doesn't already have one.
9. Put in extra sill cocks around your foundation for garden hoses.
10. Pipe underground water to a garden pool, fountain, or bird bath.

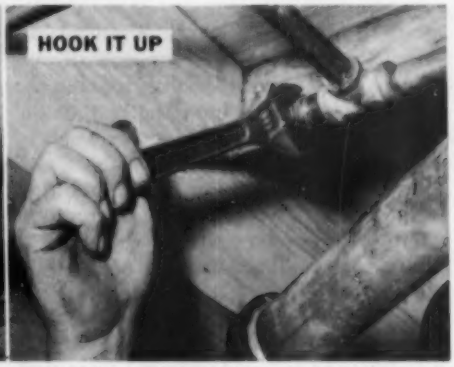
IN TIGHT SPOTS where you can't saw tubing, use this roller-type cutter that's simply clamped to pipe, then twisted around it. Cutter leaves heavy burr on inside edge that must be reamed out before attaching fittings.



SIMPLE MITER BOX made of wood scraps insures square cuts. Space sides of box apart same width as tubing (¾" spacer for ½" pipe; 1" for ¾" pipe) to hold it snugly during sawing. Use 32-tooth hacksaw blade.



INEXPENSIVE BENDING SPRING, inserted in tubing, keeps walls from collapsing when you have to make a short-radius bend near an end. If spring sticks inside, tap tubing with a mallet to jar it loose for easy removal.



TO JOIN COPPER PIPE to regular galvanized-steel plumbing, use an adapter fitting that has standard pipe threads on one end and copper joint on other. Fittings come with flare or solder joints and male or female threads.

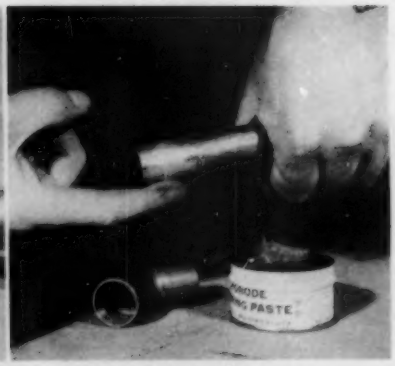
tubing comes from the die work-hardened, and some of it is then annealed to soften it.

You can snake this easily bent soft-temper tubing down through walls and through holes bored in studs and joists just like electrical wiring. When you come to a corner, you simply bend it where you want it to go, saving installing an angle fitting. Because it comes in lengths up to 100′, you can make long, unbroken runs that virtually eliminate all connections except at the ends.

Outdoors, the flexible soft tubing withstands an occasional accidental freeze without bursting. When run underground it gives as the earth settles and heaves, minimizing breakage. It also is less subject to damage from expansion and contraction, which in hot-water lines is as much as 1¼″ per 100′.

Hard-temper tubing, not annealed, comes in standard 20′ lengths. Use this rigid tube if you're a stickler for neatness and also in places where exposed lines may be kicked, knocked or otherwise damaged.

Hard tubing can be bent, but only in a leverage-type tube bender. If one isn't available, it's best to figure on using the standard angle fittings, which probably won't take any longer to solder on than



How you make a soldered connection

TO MAKE STRONG JOINT, copper must be thoroughly clean. Rub outside of tubing and inside of fitting with fine abrasive cloth. Remove burrs inside pipe with a round file.

APPLY THIN COAT of non-corrosive soldering flux to outside of tubing and inside of fitting. Then slip the tube into the fitting and wipe off excess flux around the joint.

attempting to make bends. If you have a lot of corners to turn, you can always insert a length of soft tubing, making the bends in it, even where the rest of the plumbing is of the rigid type.

Pick the right weight. Both hard and soft tubing come in two different weights, called K and L, that are commonly used in home plumbing.

Type K, a thick-walled, heavy-duty tubing, is best for exposed lines that might become dented and is only a little more expensive than the lighter weight. It's also used for underground lines that are subject to strain, for gas service lines, and for the very best plumbing and heating systems.

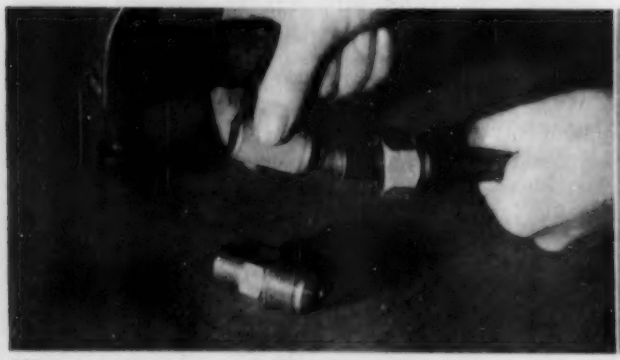
Type L is a lighter weight that's used for most home-plumbing and radiant-heating work. It's fine for all average indoor lines that are reasonably well protected.

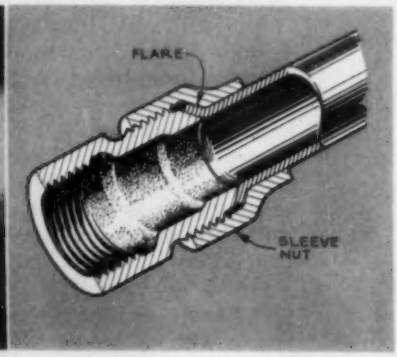
What size to use? If you buy small-size tubing at an auto-supply store for your car, you'll find it sold according to its outside diameter. In all other cases, though, copper tubing is classified according to its nominal inside diameter, just as steel pipe is, and this is what you ask for at plumbing shops.

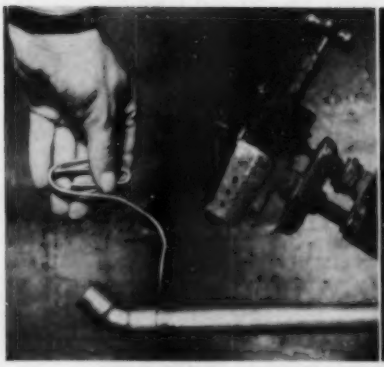
How you make a flared connection

SOLDERLESS JOINT requires two-part fitting that clamps tubing in between. To make flare, slip sleeve nut on pipe first, then hammer flaring tool into end to roll edges outward.

WHEN SLEEVE NUT is slipped up against flare and screwed to other half of fitting, the two parts squeeze the tubing tightly between them. Such joints withstand 3,000 lb. per sq. in.







PLAY FLAME OF BLOWTORCH over fitting and tubing to heat both evenly. When copper is hot enough, solder flows freely when you touch joint. Capillary action draws solder in.

KEEP FEEDING SOLDER into joint, removing the blowtorch each time solder is applied. The connection is complete when a bright ring of molten solder shows all around the joint.

BRUSH OFF EXCESS SOLDER with old paintbrush. This will also show if solder has completely filled joint. If not, add more. Don't move joint until solder has become cool and hard.

For homes with normal water pressure, use a ¾″ copper branch line if it supplies two or more fixtures; ⅝″ tubing to sill cocks; ½″ tubing to individual bathroom or kitchen fixtures. As a rule of thumb, it's safe to use tubing one size smaller than the galvanized pipe you'd otherwise put in.

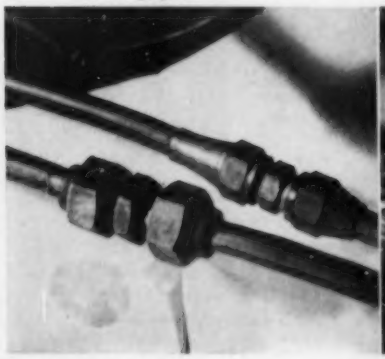
Fittings make it easy. Two types of connectors give you a choice of soldering or not. A soldered-on fitting can be used on both hard and soft tubing, while the solderless kind, called a flare fitting, is recommended only for the soft.

Use the solder joint for neat, permanent jobs. Flare fittings are more expensive, but are good for temporary lines or installations that may have to be disassembled since they are easily taken apart and re-used. They may also be a lifesaver in tight spots where the use of a blowtorch for soldering might be difficult or dangerous.

Both types come in a complete line of tees, elbows, couplings, reducers, valves, sill cocks and other fittings. You can also buy combination fittings that have standard pipe threads on one end and either a flare or solder connection on the other.

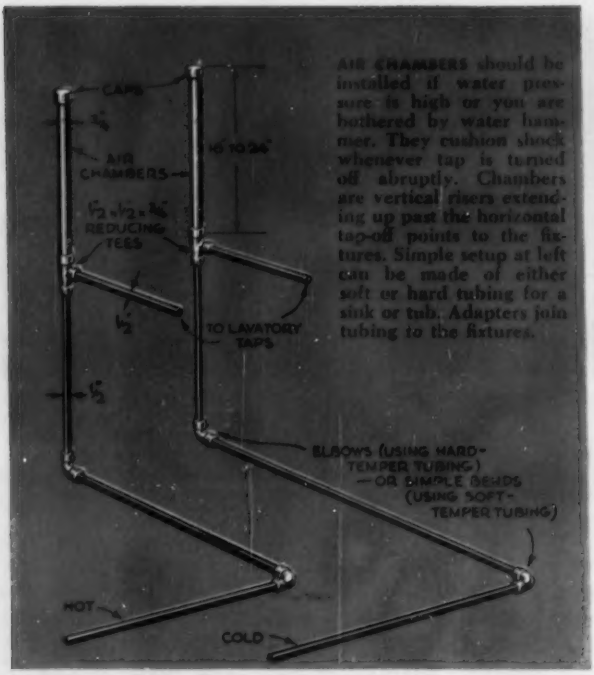
Installation. Whenever possible, keep

AFTER JOINTS ARE MADE, be sure to check for any slow leaks. Slide sheet of paper under joints and leave overnight. Any drippings will show up as spots on the paper.



FLARED FITTINGS make it easy to disconnect lines on equipment that must be disassembled from time to time, like this oil-burner unit. Draw nuts up tight, but don't twist joints.

YOU CAN FIX YOUR CAR, too, with S.A.E. flare couplings that fit automotive parts. Using soft tubing, you can replace fuel and other lines that have become worn or broken.



AIR CHAMBERS should be installed if water pressure is high or you are bothered by water hammer. They cushion shock whenever tap is turned off abruptly. Chambers are vertical risers extending up past the horizontal tap-off points to the fixtures. Simple setup at left can be made of either soft or hard tubing for a sink or tub. Adapters join tubing to the fixtures.

cold- and hot-water lines at least 6″ apart to reduce sweating. If you are providing for an automatic washer or if water pressure is high, it's a good idea to put in air chambers at fixtures to cushion water hammer—the noisy shock when a tap is turned off suddenly. A sketch shows how this is easily done.

Install all horizontal water lines with a slight pitch, about ¼″ per foot, to allow complete draining when necessary. Soft tubing should be supported by straps every 6′ to prevent sagging, hard tubing every 10′ or at most 12′.

If you're burying an underground line, don't put a cinder fill in the trench. When the ground becomes wet, sulfur compounds in the cinders will corrode the tubing.

When you're tapping into existing plumbing, especially for hot water, make sure it's one of the domestic lines and not part of the heating system—often an easy mistake to make. Trace the lines carefully back so you are dead sure where they come from. Besides shutting off the main water supply, close off any intermediate valves that will reduce the amount of water that will drain from a cut line.

If you run into a puzzler, or if you plan to work on gas, oil or heating lines, don't feel reluctant to call in a plumber for advice and counsel. He'll probably begin by discouraging you, but if you make it clear you expect to pay for his advice, you'll get useful tips and valuable safety precautions—and still be way ahead of the game in total cost.

There's another good thing about copper tubing. While it's slightly more expensive than steel pipe, it can't rust or clog and if properly treated will outlast all of us. When they dug into the Pyramid of Cheops in Egypt, archaeologists uncovered a copper pipeline that fed the Pharaoh's bath. That 46-century-old copper pipe would still hold water.

I don't expect to be around that long, but it sure is good to know. END

Need an Extra Shower?

See PSM Next Month

PREFABRICATED shower cabinets are easy to install. You can put one in, as a second shower, in the basement, utility room, powder room, or even in the attic or garage.

If you've read the article that ends (above) on this page, you know what's involved in installing copper tubing as home plumbing. An article in the April issue will tell you how you can use these simple methods to add your own prefab shower.

KEEPING THE Home SHIPSHAPE

KNOTS IN LUMBER contain resin and pitch which may eventually seep through if covered directly with ordinary oil paint. For a good paint job, remember an old trick of the trade and seal all knots with a preliminary coat of shellac.

STOP BULB SNATCHING by inserting extras in a plywood rack set in a handy drawer. Size of holes and length of legs will depend on depth of the drawer.

GUARD YOUR FINGERS by providing a handle before you whang away at a chisel. A simple dodge is to slip a box wrench over the hexagonal shank of the tool.

A TOWEL ROD can be fitted into a tight corner if one end is cut off and inserted in a hole bored in the adjacent wall.

SAVE MILK CARTONS to store nails and other small items. Cut down to fit a wooden box with pivoted handles, they make a compartmented tote box.

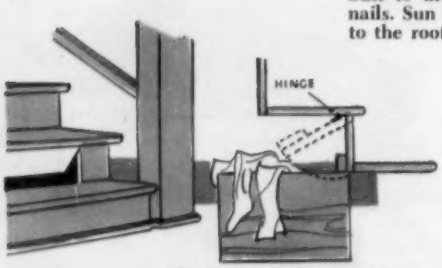
Please turn the page for more home tips

More Home Tips

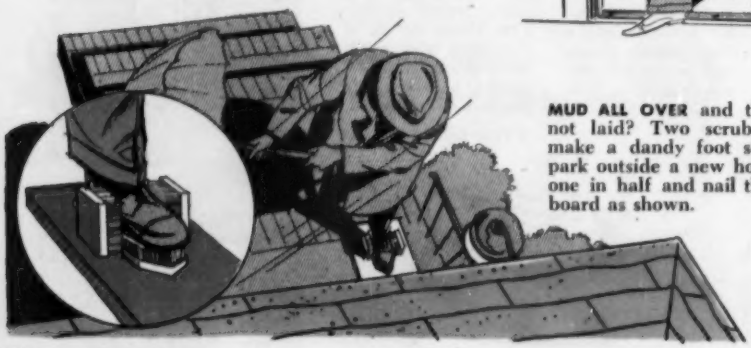
AN OLD SHADE mounted under a window near the sewing machine can be pulled out and hooked taut to the machine to support large work.

SHINGLES SPLIT? Cut slips of single-ply asphalt roofing to fit under shingles from butt to first row of nails. Sun bonds 'em to the roof.

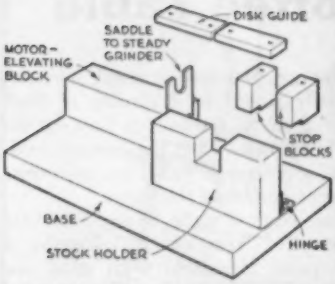
A CEDAR CLOSET becomes a real gas chamber for moth larvae if you weatherstrip the door so it's airtight.



A SWINGING DOOR cut in a stair riser will chute soiled clothes to a basement hamper. Hang it on spring hinges so it snaps shut on release.



MUD ALL OVER and the walks not laid? Two scrub brushes make a dandy foot scraper to park outside a new house. Saw one in half and nail them to a board as shown.



CUTOFF MACHINE "saws" small parts accurately. Cutter is a disk made of two pieces of fine abrasive paper glued back to back and stabilized by a divided guide on a hinged stock-holder. Although the disk burns through hard material, heat is transferred along its own edge too fast for it to be damaged.

You can put friction to work

Sawing Wood with Paper

JUST as friction cutting has its practical uses in industry (cutting structural steel parts is one of them), it can serve you in a workshop. You need no more than a small disk of wrapping paper, mounted in a fast-turning mandrel, to breeze through small strips of hardwood or plastic. Not only will the seemingly fragile paper make an almost dustless cut without damaging break-through—it will do a mirror-smooth polishing job as it goes along.

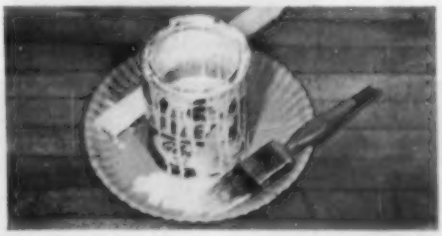
For a more dependable friction cutter, cement two sheets of fine abrasive paper back to back. Then take a ¼″ dowel, slit one end and insert a pointed section of razor blade in the slot, anchoring it securely with tape or wire.

Slip the dowel in a pencil compass and use this improvised tool to cut a perfect circle, 2″ or 3″ in diameter, from the abrasive paper. Enlarge the compass-point hole with a drive punch and you're ready to mount the cutter on one of the mandrels that usually come with hand-grinder sets.

If you plan to go into production on a number of small parts, it will pay you to make a simple cutoff machine of the type shown in the illustration. To operate it, simply rock the stock-holder forward on its hinges.—*Walter E. Burton.*

Picnic Plate Catches Paint

DRIBBLES from a paint can won't get on the workbench or floor if you set the can on a paper picnic plate. Stick the plate to the can with a few drops of the paint, and you'll have a tip-proof container as well. There is room at the sides to take the mixing stick and paintbrush.—*Norm Jacky, Fond du Lac, Wis.*



One-Evening Projects

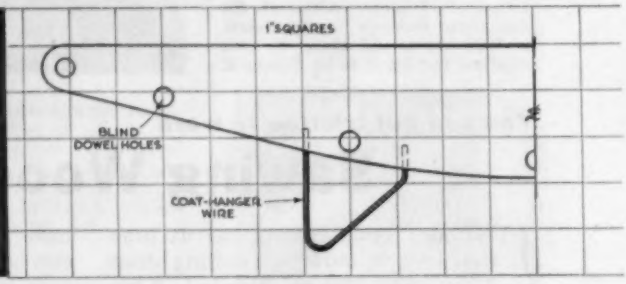
Three Decorative Items for Your Coffee Table

WEAVE CLOTHESLINE ROPE over and under the five center dowels (below), tacking ends out of sight on lower part of sides. About 50′ will see you through.

1 **Tropical in design,** this tray of wood, wire and rope is especially suited to a display of fruit. Shape the sides from ½″ hardwood. Lay out the several ⅜″ blind dowel holes from the pattern, making sure to match opposites or you'll run into trouble when you start assembling the piece.

Drill the bottom edge a tight fit for legs bent from coat-hanger wire. Next cut 8½″ lengths of dowel. Sand all parts, assemble with glue and weave the bottom while the glue is still drying.

Finish the sides with stain or as desired, enamel the legs black or a color, and coat the rope with clear lacquer.—*Sylvester J. Zuk, Troy, Mo.*

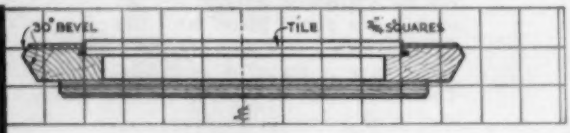


MAKE YOUR CLAMPING JIG for the frame of four pieces of scrap stock nailed to a base. Drive eight small wedges tight at corners.

2 **A framed-tile pot holder** is so easy to make you can saw out and glue up the frame while the lady of the house is preparing dinner, and then bevel the edges after helping with the dishes.

For a 6″ tile you will need about 36″ of ¾″-by-1½″ scrap stock, preferably a pleasing hardwood. Rabbet for the tile, and then cut the piece to the four required lengths. Carefully miter the ends 45° to assure square corners. Glue and clamp; then spread adhesive in the rabbet and set the tile in place under weights.

Later in the evening bevel the edges, sand smooth, glue on a ¾″-by-7″ plywood base and a 7″ square of felt. Finish with lacquer.—*Vern Forsberg, Seattle.*

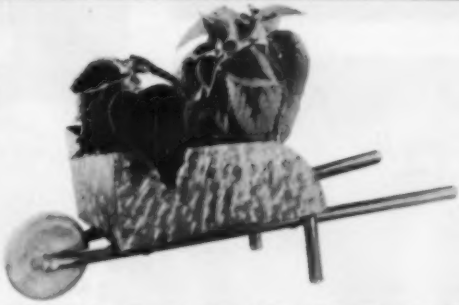


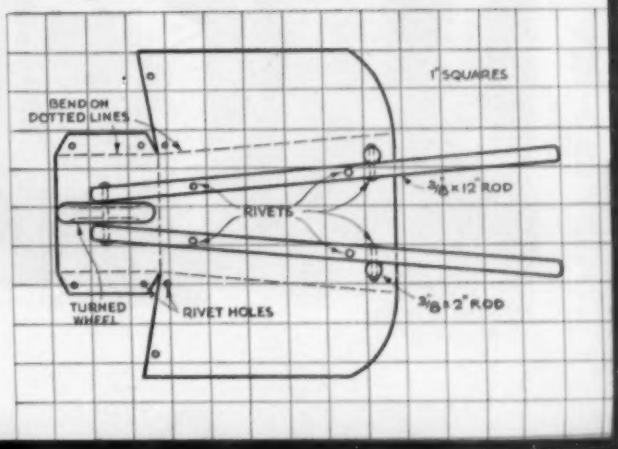
Sheet and rod aluminum, which you can work with simple tools, make up the body, handles and legs of a dainty wheelbarrow that will just hold two small potted plants.

Trace the body pattern on the sheet stock, cut it out with tin snips, household shears or a fine-toothed jigsaw, and sand the edges smooth. Bend to shape and rivet the joints with the flaps on the inside. No finish is required, but the body can be textured before bending with a sandpaper disk on a ⅜" dowel swirled in a drill. Glue a rubber cushion between the sandpaper and dowel, and apply lightly to the surface.

Turn a wooden wheel and fit it on an aluminum axle riveted to the handle ends. If you can't find a rivet long enough, turn a piece of the rod down to ¼". A wood lathe will do.—*Elma Waltner, Hurley, S. D.*

3



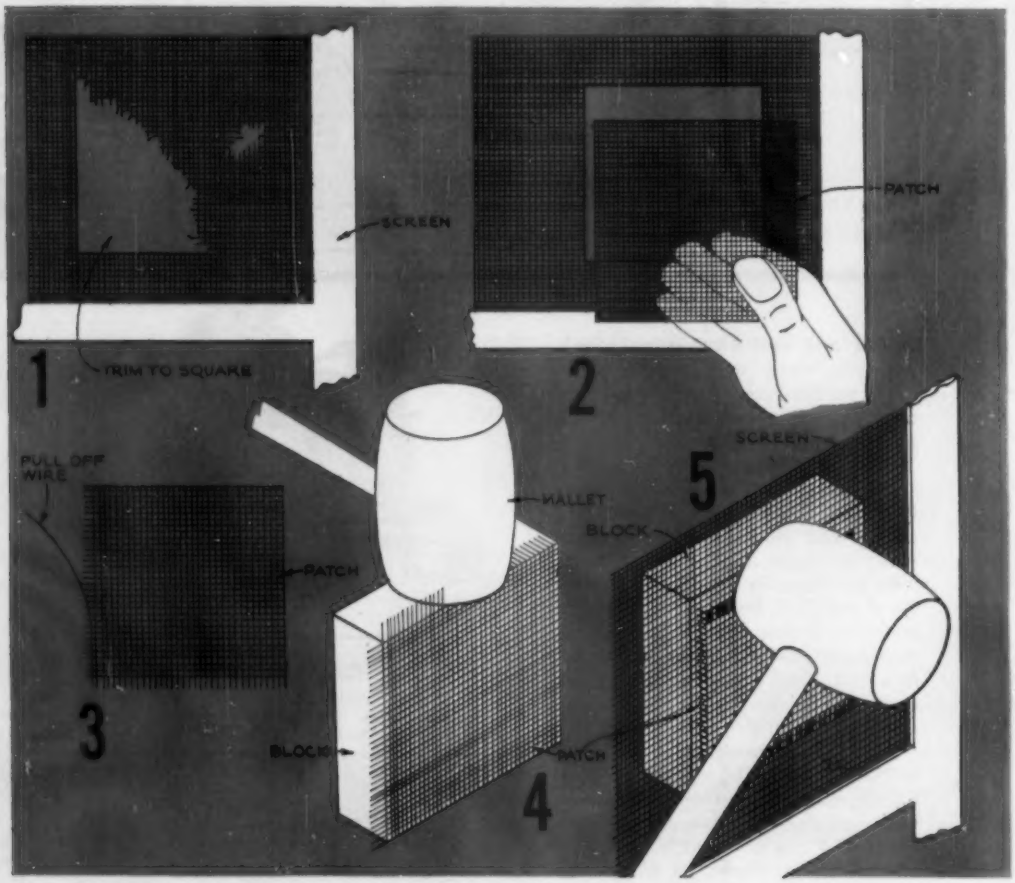


How to Patch a Screen

Now's the time, before lazy spring days arrive, for necessary repairs on all your window screens.

TRIM the break to a square or rectangle shape with a pair of tin snips or old scissors. Then snip out a patch from a piece of scrap wire. Make the patch big enough so that it overlaps the screen cutout about ½″ on each side. With the patch in hand, pull out two cross wires on each of its four sides. Using a mallet and a block of wood, bend the exposed wire ends outward at right angles.

Carefully place the patch over the cutout so the bent wires can be pressed through the screen. In doing this, apply the patch on the screen surface that will be inside the house. Then, backing up the patch with the wood block, use the mallet on the opposite side of the screen to bend over the wire ends. For a neat appearance, bend the wire inward toward the center of the patch. As the final step, paint the patch to prevent rust and blend it with the rest of the screen.—*William B. Eagan.*



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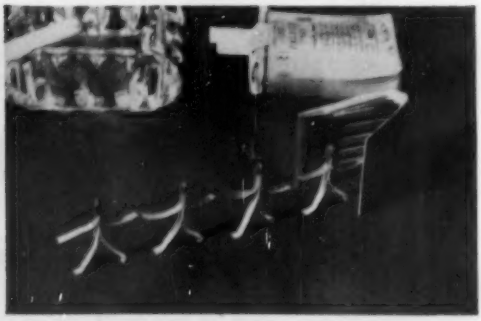
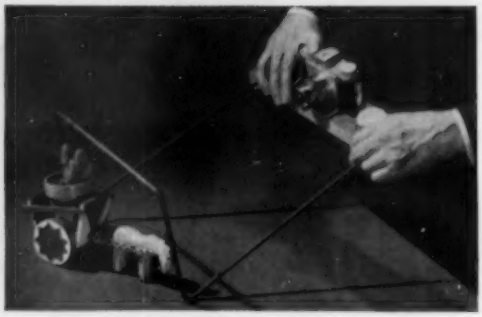
How close-up photography can add enjoyment to your hobby





Whatever your hobby is, photography can make it more interesting and rewarding. Comes the time when you put the finishing touches to that scale model car . . . or locate that elusive butterfly to add to your collection . . . or that new African violet puts forth its first blossom—you'll want to record the big event. Here's where close-up shots are really worth making—especially if you make them in color, for screen projection. Imagine picturing a rose close up, and then showing it in color, 4 or 5 feet wide, on a screen! What's more, close-ups, whether in black and white or color, give you a permanent record. They prove what happened, and they can be enjoyed for years to come.

How to make close-ups

The average camera does not focus for extreme close ranges, but it can be equipped to do so with a simple supplementary lens, such as a Kodak Portra Lens 1+, 2+, or 3+, or a combination of two of them.

If you set the camera at "infinity," and put a 3+ Portra Lens over its lens, you can bring the camera to just 13 inches from the subject; and, if you set the camera for 3½ feet, the taking distance can be only 10 inches! The 2+ Portra Lens gives a range of about 13 to 21 inches, and the 1+ a range of about 20 to 45 inches. Each lens comes with a sheet of instructions, distances, and field sizes. Your Kodak dealer will be glad to help you select the lens attachments you may need.

Focusing and viewing important

Since the range of sharpness is very short when your camera is focused on a near-by subject, proper focusing and view finding are extremely

important. Measure your subject distance accurately to be sure your focus is exactly right.

A great many cameras have the viewfinder on top. Thus, in taking extreme close-ups, much that appears in the top quarter of the viewfinder may not be "seen" by your camera lens. Often this can be avoided by making sure that the center of the object to be photographed is on the same level as the lens.

Such problems as focusing and viewing can be easily solved, however, by the use of what is known as a "focal frame"—a simple wire frame that attaches to the base of your camera, clearly defining the area your lens can catch sharply and also providing camera support (see lower right picture on opposite page). If you would like details on how to construct a focal frame for your camera, write to our Sales Service Division.

Table-tops are fun, too

A table-top, as the name implies, is a close-up picture using a table for a stage. The picture of the marching matches, on the opposite page, required the simplest of props. There's no limit to what you can do with a little imagination. Toothpicks, pipe cleaners, fruits and vegetables can be fashioned into figures; table salt or cornstarch makes realistic snow; twigs appear as trees and small rocks as boulders.

For average lighting, ordinary 100-watt bulbs do very well. Most table-top pictures are taken with time exposures. So you'll need some means of holding your camera steady—either a stand or tripod.

The Kodak Technical Close-Up Outfit

Everything you need for making close-ups in one package. Even if you've never had any photographic experience, you'll find it easy to get fine results for no focusing or meticulous composing is needed. Includes Kodak Pony 828 Camera, bracket, focal frame, Portra Lens and filter in slip-on adapter, and Kodak B-C Flasholder with Kodak Close-Up Flashguard. First time you use it, you'll notice the focal frame defines the field, holds your camera steady, positions the flasholder for proper lighting. You can get the complete outfit for $62.75, including Federal Tax.

If you have a Kodak Pony 828 or 135 Camera and flasholder, all you need to get is the **Kodak Pony Close-Up Kit, $19.95.**

It's easy to get extreme close-ups with both still and movie cameras with **Kodak Portra Lenses,** from **$2.65.**

For table-top time exposures with Kodak Retina and other cameras, the **Kodak Table-Top Camera Stand, $29.50.**

Portra Lenses, filters, or other lens attachments fit your camera when you use **Kodak Adapter Rings,** from **$1.35.**

For combining Portra Lenses for stronger effects, use **Kodak Retaining Rings,** from **$1.15.**

Prices subject to change without notice

Eastman Kodak Company
Rochester 4, N. Y.

Kodak

New Workshop Hangs on Door

Two-cabinet unit folds up, is quickly tucked out of the way between projects.

IT'S A TIGHT SQUEAK, but even this narrow butler's pantry does double duty as a home workshop with a hanging bench and tool cabinet attached to the inside of a broom-closet door.

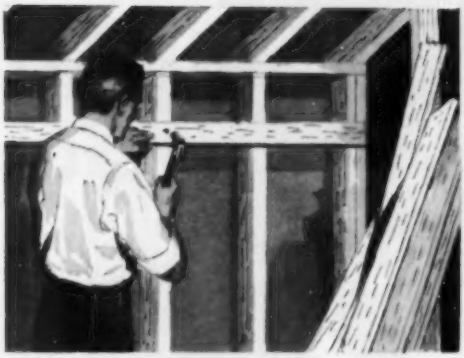
COMPACT SHOP'S INVENTOR, Lester Mehlman, uses the original model hanging on two studs nailed to a wall in his basement where working space is at a premium. The cabinet has electric outlets for a gooseneck lamp and hand power tools.

LACK of space can't cramp your style as a home craftsman if you have a closet door on which to mount your workshop. A mere 7″ depth inside the closet to take the folding shop, complete with bench, and a little elbow room on the outside will set you up for pursuit of your bent with tools. Or the 7″-by-18″-by-76″ two-cabinet unit can be hung on studs nailed to a utility-room or basement wall.

Equipment includes a gooseneck lamp, perforated metal back, 12 tool pegs, a multiple electric outlet with 8′ cord and plug, and the folding bench. Hung on a hefty piano hinge, this bench is a ¾″ bonded slab of plywood and surface-tempered hardboard framed in steel. Its swing-down legs lock in place and are adjustable to height or variations in floor level. Privacy of your tool collection can be assured by a padlock.

A four-shelf accessory cabinet fitting under the bench is extra equipment. A lip on each shelf keeps spilled parts off the floor. The maker is Dor-Bak Corporation, Board of Trade Building, Chicago 4. Price of bench and tool cabinet only is $39.50; with the accessory cabinet, it comes to $54.50.—*Kenneth Wylie.*

Add extra living space this easy, economical way



1. Do the job yourself. Start by framing unused space in the attic, basement, enclosed porch, or converted garage. Then provide a nailing base for the interior finish by nailing 1" x 3" wood furring strips at right angles to all framing members. Surface must be smooth and level.

2. Ceiling installation is easy with Armstrong Temlok® Tile. Temlok's Lok-Bevel* joint hides all nails or staples, assures neat joint lines, helps you do a really professional looking job. Pre-painted in Snow White or Light Ivory, Temlok comes with a smooth or noise-absorbing perforated surface.

3. Walls go up in no time with Armstrong Temlok Plank. The long, random-width planks are quickly nailed or stapled to the furring. Temlok Plank's attractive "Suntan Blend" adds permanent beauty to the room. Both Temlok Tile and Plank build, decorate, and insulate in one simple application.

4. Job's done in a day or two. Temlok is clean and fast to work with, leaves no mess, little waste. And there's no painting to do—once Temlok is installed the job is finished. Just add a few decorative touches and you'll have a comfortable extra room at remarkably low cost.

Get the full story on Temlok Tile and Plank and other Armstrong building materials from your local lumber dealer. He'll be glad to show you samples and give you help with your remodeling plans. For the free booklet, "New Ways to Remodel Your Home," write Armstrong Cork Company, 3703 Washington Avenue, Lancaster, Pennsylvania.

* Trade-Mark

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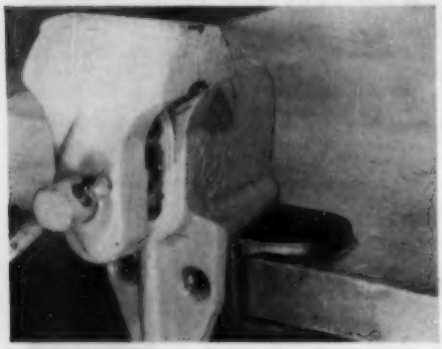
Divider Holds Knickknacks

A SHADOW-BOX partition dividing your living room adds a modern touch and gives the lady of the house an opportunity to rearrange the furniture for a new look.

Make the frame of one-by-four stock with half-lapped joints for a grille. Front and back of the lower section are faced with ¼"-by-30"-by-48" plywood. Over-all dimensions of 48" by 78" allow for 11 1/16"-square shadow boxes for a display of small plants, figurines, hobby items or your own photographs.—*John O. Bock, Yakima, Wash.*



Vise Used Anywhere with Pad

You can clamp a vise on a kitchen table or other surface without denting it by using the rubber pad of a meat grinder.—*Frank A. Javor, North Bergen, N. J.*

Eraser Protects Glass Cutter

A GLASS cutter will give you more mileage if you cover its cutting wheel before tossing it into the toolbox or drawer. The hollow erasers used over the ends of pencils are excellent for the purpose. A drop of oil inside the eraser keeps the wheel lubricated. —*Roland Cueva, Costa Mesa, Calif.*

Drill Shield Guards Eyes

A PIECE of cardboard cut about 8" square and slipped over a drill will protect your eyes from flying particles when working on concrete.—*Charles H. Hardy, Los Angeles.*

News About Glues

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Because Weldwood Presto-Set Glue sets so fast (20 to 30 min. on soft woods—somewhat longer on hard woods), you can often complete a project in one session! Forms a powerful, lasting bond that does credit to any craftsman! Also available in jars. 25¢ & 45¢ tubes — pint and quart jars.

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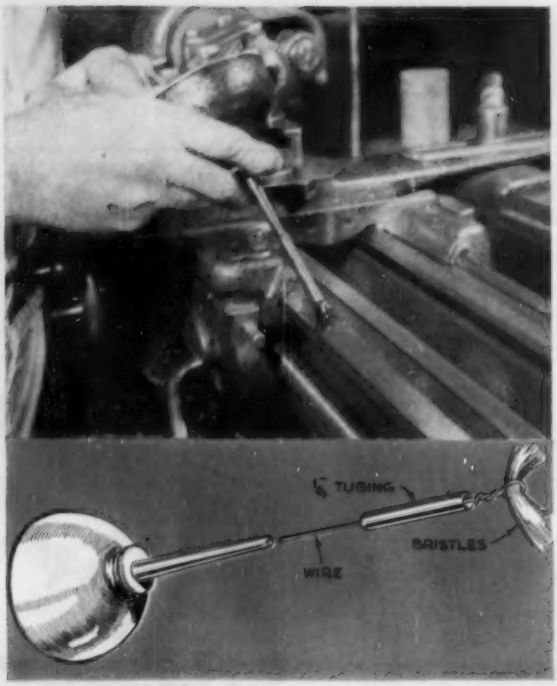
NEW Shop Ideas

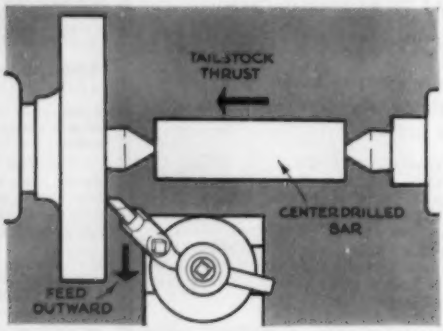


Brush-Oiler Cleans Ways. With this oiler you brush chips off while you lubricate the lathe ways, all in half the time the job took before.

Tie a small bunch of bristles from an old paintbrush tightly together in the middle with soft copper wire. Thread the wire through a piece of tubing and pull until the bristles wedge firmly in the end. Snip off all but a couple of inches of wire. Push this into the spout, jamming the tubing onto the spout taper.—*H. L. Luckett, San Antonio, Tex.*

Rubber Plugs Oust Chips. Hollow-head screws on machine tools may get so filled with chips that a wrench will not go in. Foam-rubber plugs end that annoyance. The wrench compresses the plug and seats readily. As the wrench is removed, the rubber springs back, leaving no space for chips to accumulate.

Cut the plugs from fine-grained foam rubber with a hollow punch or with scissors. Make them a snug but not tight fit, and flush with the tops of the screws. If they will be exposed to oil, use an oil-resistant latex sponge rubber. Brush off chips before inserting the wrench.



How to True a Faceplate. If you want to turn a faceplate perfectly flat, remember that any end play in the spindle will let the plate spring outward every time the tool bit passes one of the slots, creating a wavy surface.

To eliminate this, mount a piece of bar stock between centers as in the drawing. Turn up the tailstock enough to put considerable pressure on the live spindle. Use a sharp, well-honed bit, feeding from the center outward. Take a very light finishing cut to eliminate the effect of spring in the tool as it passes the slots.—*H. J. Gerber, Stillwater, Okla.*

 Please turn to page 242 for more shop ideas

Young Men With Mechanical Skills

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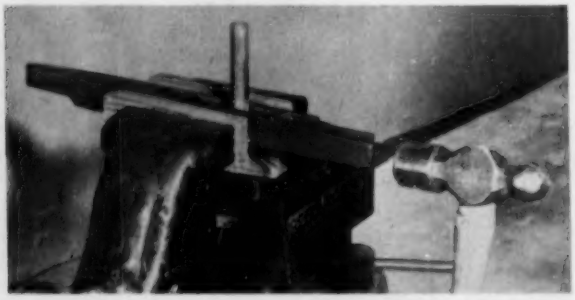
Bow Sander Fits Curves. On rounded or irregular work, this flexible sander gives a smooth finish with less effort than ordinary methods. By releasing the strip at one end, you can even thread it through cutouts like a coping-saw blade to sand inner edges.

Make the bow from a heavy phonograph spring or by cutting an old handsaw to about 3″ in width. For the bow handles, saw two 4″ lengths off a 1¼″ dowel, or from a hardwood garden-tool handle. Saw a lengthwise kerf to the depth of half the diameter in each. Round the ends smoothly.

Sanding belts can be bought in rolls of various widths. Cut a piece short enough to bow the spring, plus 1″. Fold ½″ of the strip over each end of the bow and push into the handle kerfs.

MORE SHOP TIPS

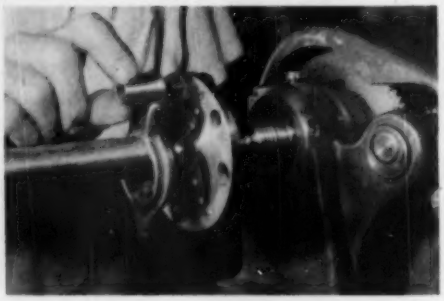
Hand-Hold for Small Parts. In our metallurgical lab, holding thin samples by hand for power sanding and polishing often caused finger injuries. Now we do it by wrapping a 5″ length of masking tape, sticky side out, around index and middle fingers. Pressed on, the thin piece is securely held by the adhesive.—*Edward J. Petersen, Catonsville, Md.*



Files Knurl Soft Metals. To put a good nonslip surface on plastic, copper, aluminum or other soft rod, clamp it upright in a vise between two coarse files, with a wooden block between each jaw and the nearer file, as at left. Then tap one file with a hammer, making the rod roll between the file teeth.—*Hugh Lineback, Stillwater, Okla.*

Cone Eliminates Backlash. All play between the lathe spindle and dog-driven work is removed by this cone-shaped driver. It can be turned from 1¼″ shafting; the taper is not critical so long as it fits the fingers of the dog at about its midpoint. Tap it through ½″-20.

Clamp a ½″ cap screw in a faceplate hole with a jam nut. Screw the cone on up to the nut. Then, with the work in place, turn it out between the driving fingers until it holds the dog firmly.



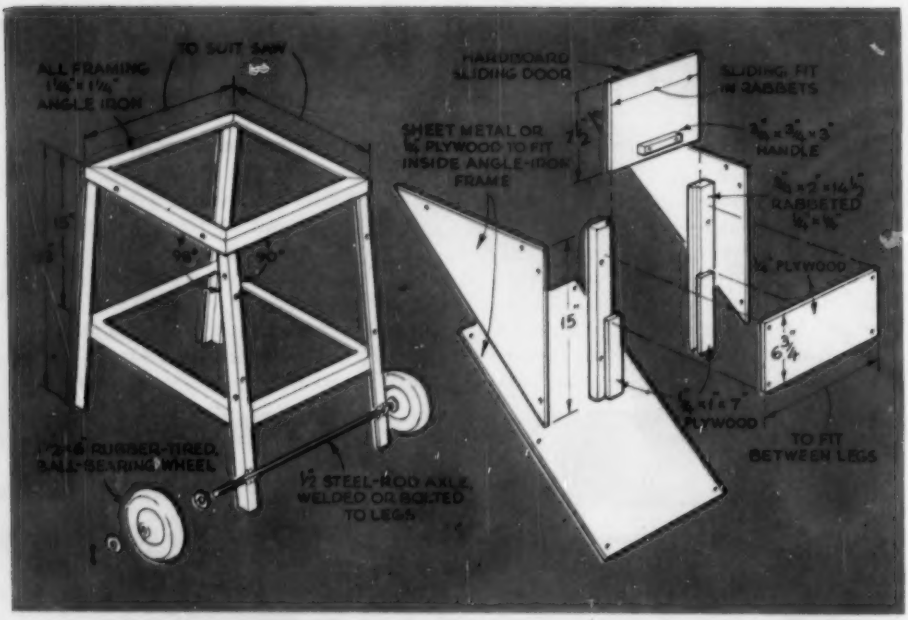
How to Build a Saw Stand

Wheels make it mobile; a dustbin keeps the floor clean.

THERE comes a time when a table saw must be moved from the workbench and mounted permanently on its own stand. For a fraction of the cost of most manufactured units, you can build a husky stand of angle iron, and for a couple of dollars more you can add a pair of ball-bearing wheels that make it easily mobile for outdoor jobs and other work that cannot be moved to the saw.

I put a finishing touch on mine by building in a sawdust compartment to keep the basement clean. It's a feature not often found on low-cost stands.

Most of the project is a simple one of cutting and bending. Corner joints may



be drilled and held with stove bolts. Having the equipment for the work, I preferred the added rigidity of welded joints. A shop will do this for a small charge if you provide the parts ready to fit and have the joints properly marked. For extra strength the top frame and leg brace were each made from one piece, notched at the corners and then bent to shape.

I obtained a pair of 1½″-by-6″ rubber-tired ball-bearing wheels to fit a ½″ steel-rod axle. Their diameter makes it easy to roll saw and table over the ground as well as the floor. The axle was clamped in position with the wheels just touching the floor but carrying no load, and then welded in place and drilled at both ends for cotter pins. For an all-bolted job, you can make pipe clamps from ⅛″-by-1¼″ strap iron, bending around the axle for the curve and attaching with four bolts each. The offset position of the axle is an asset in tilting the stand, as you would a hand truck, to roll. Two wheels are an improvement over castors since all four legs set firmly on the floor when the saw is in operation.

After drilling ¼″ holes at the top corners, I bolted the saw in place while I could still get at it. Then the sawdust catcher was added. This may be made of sheet metal or plywood. Bolt the sides on first, follow with the sloping bottom and finally the front assembly with its sliding door.—*John Rogers, Dallas, Tex.*

Pads Covering Clamp Jaws Prevent Marring of Work

RUBBER or plastic chair glides used over the jaw faces of a C clamp will protect the surface of a workpiece being glued up by spreading the pressure over a larger area. You can find these household accessories in most novelty stores in a number of sizes and styles that are suitable for a variety of clamping jobs on wood and other materials. —*Norm Jacky, Fond du Lac, Wis.*

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AC SPARK PLUG DIVISION • GENERAL MOTORS CORPORATION

Gus Pulls a Switch

[Continued from page 176]

fully folded the map and put it away. There was a moment or two of silence as they waited for their teacher to start the car. Instead, Mr. Wismer thoughtfully drummed his fingers on the steering wheel.

"By the way, Ned," he said, "after the garageman left, I took the liberty of going over the wiring on your trailer."

The air was electric with surprise. Ned was the first to find his voice. "Sir?" he ventured.

"I noticed that you grounded one of your wires to the frame of the trailer."

"Y-yes, I did."

"And the frame of the trailer is attached to the chassis of my car."

"That's right," said Ned.

Boys Get a Grounding on Wires

"I also observed," Mr. Wismer went on, trying not to show how much he was enjoying himself, "that one of the prongs of your plug appears to carry current from the battery while the other goes to the grounded wire. Is that right?"

"Why, yes, sir."

"Of course," Mr. Wismer said modestly, "I'm only a history teacher and don't know anything about wiring, but"—he paused; in all his teaching career he had never had quite so much attention from his students—"but I probed around a bit, and I'm afraid, Ned, that you overlooked something."

"But, Mr. Wismer," Ned protested, "that's how you're supposed to wire them. You have to have a ground wire, and the ground wire—"

"The ground wire must be attached to the frame," Mr. Wismer said.

"Yes . . ."

"What happens," Mr. Wismer continued, "when the wire from the battery goes directly to the ground?"

There was a thoughtful silence as the import of his question sank in.

"I guess," Ned said, "there would be a short."

"Exactly!" exclaimed Mr. Wismer. He opened the car door. "Come around here and let me show you something."

The three boys followed their teacher to the back of the car. Mr. Wismer took out his flashlight and directed its beam at the place where the tail light was attached to the socket on the car.

"Well?" Ned's voice was defensive.

Mr. Wismer pulled out the plug and let it drop, apparently by accident, from his hand. "How careless of me," he said. "Plug it back in, will you, Ned?"

Ned quickly inserted the prongs.

"Tsk! Tsk!" muttered the teacher reproachfully. "Just as I thought. You are a bit careless, Ned."

"But, sir—" Ned began.

Mr. Wismer pulled the plug out, twisted it, and re-inserted it. "There," he said. "It just takes a twist of the wrist."

Ned bent down to examine the connection more closely.

"That's just what I did," he protested.

"Not quite," explained the teacher. "The way you connected it, the prong wired to the ground was, most regrettably, making contact with that part of the socket that leads to the battery. A short circuit would have been—as I'm afraid it has been—the lamentable result when the lights were switched on."

Sudden understanding glimmered on the faces of all three boys. "Shall we be on our way?" Mr. Wismer suggested.

Gus Gets a Salute

They pulled out of the garage and headed down the dark street in silence.

Finally Ned spoke up. His voice was respectful. "I guess you know a lot more than we gave you credit for," he said.

They were passing the long, friendly front porch of the Commercial House. A man was seated there in a rocking chair, smoking a pipe. Mr. Wismer gave two sharp toots on his horn and waved. The man waved back.

"What did you do that for?" Arnold asked, looking around blankly.

"Just giving credit where credit is due," said Mr. Wismer. END

NEXT MONTH: Gus fixes a reluctant wagon.

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Contest closes July 15, 1955

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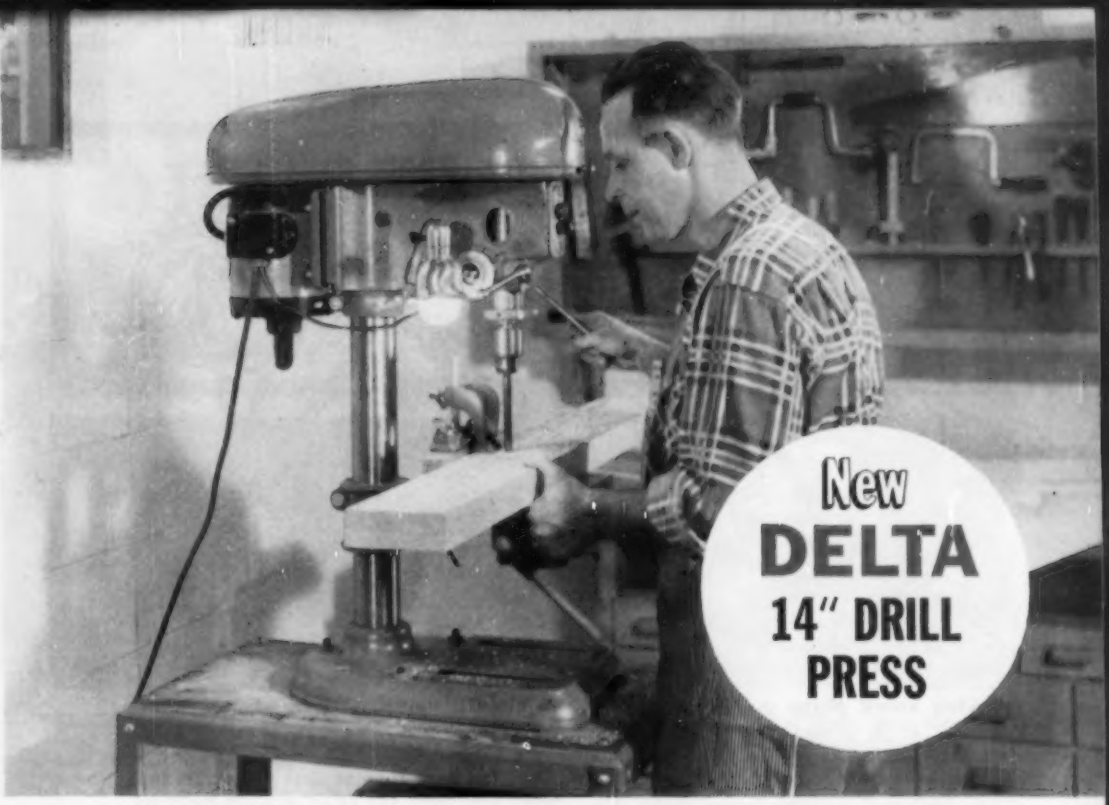

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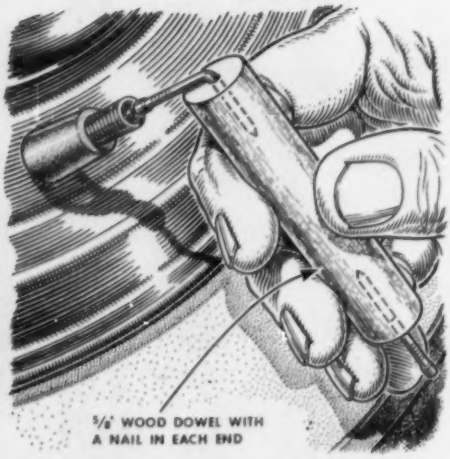
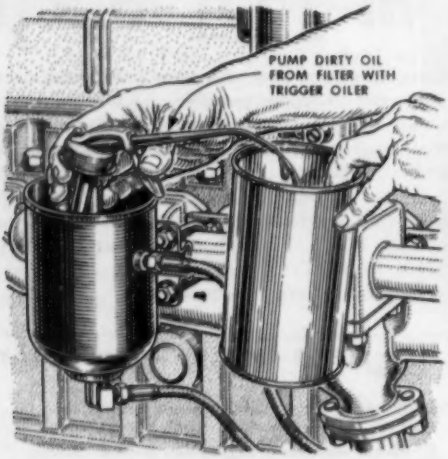
Hints FROM THE MODEL GARAGE

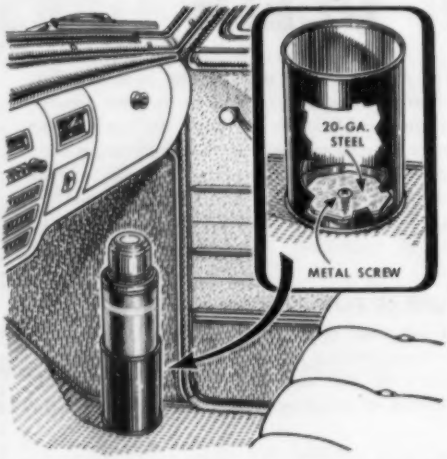
Soaking spark plugs in regular-strength ammonia is an almost cost-free substitute for sandblasting. It cleans overnight, according to John C. Roth of Philadelphia. Rinse them next morning in clear water and dry quickly in a warm place.



A simple valve opener when you are changing a tire is two six-penny finishing nails in the ends of a 4" length of ⅝" dowel. Bend one 90° for use with most cars and bikes and leave the other straight for truck and other horizontal valves.



Cleaning out excess oil when changing the cartridge in most standard filters is less messy if you use the small pump from a trigger oilcan. A piece of neoprene hose on the end of the suction tube makes a good extension for use in a deep filter.



A rattleproof holder to keep a quart thermos handy for your night-driving coffee breaks can be made from a cylinder oilcan. Cut the top off clean and screw the can to the floor out of foot range. Paint it black or to match the dash or scuff plate.

 Please turn to page 252 for more auto hints

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For Balance and Accuracy
For Satisfaction On the Job

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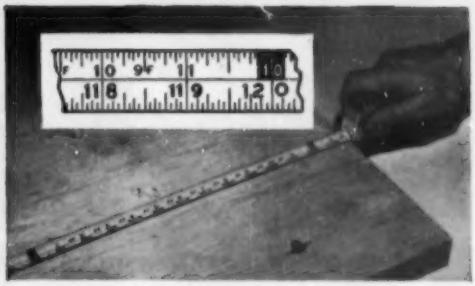
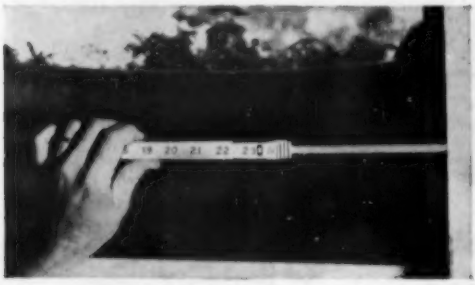


Long and Wide "Pull-Push" Rule. Stays rigid for hard-to-reach measurements. True zero hook, true reading mouth and double scale marking for accuracy. **10 ft. No. 3610W — $2.39.**



"100 PLUS" Extension Rule. Removable 8 in. brass slide for inside measurements. Rule opens to even numbers, convenient marking gauge at 2", 4", 6", 8", etc. Plastic finish, extra thick sticks, long wearing joints. **6 ft. No. X226 — $2.75.**

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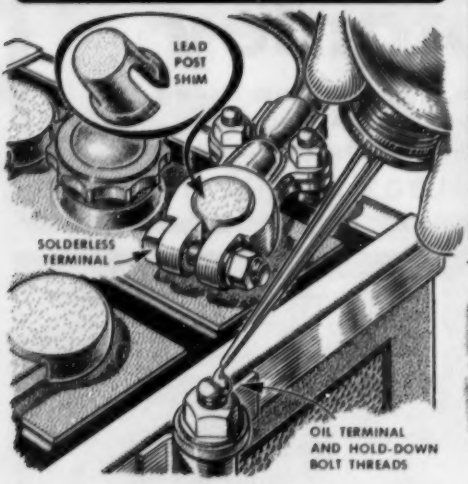
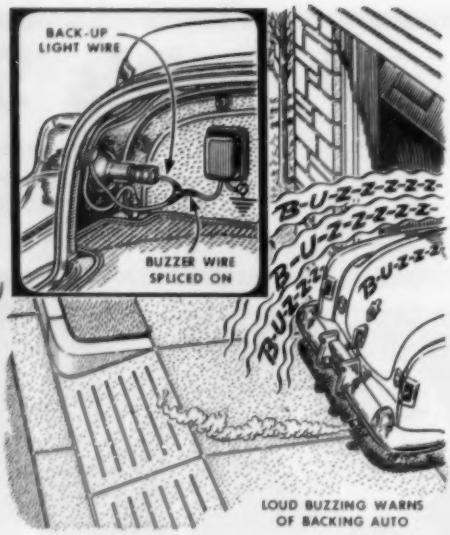
MORE Hints from the Model Garage

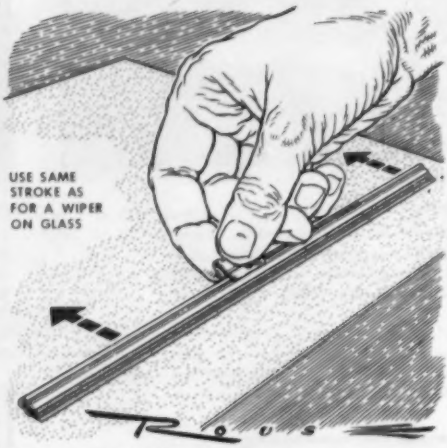


Some battery tricks, such as a spare solderless terminal to replace a broken one, may save you serious trouble on the road. An inexpensive lead shim permits tightening on a worn post. A drop of oil on the terminal and hold-down bolt threads every time you grease the car combats corrosion and makes battery removal easy.



A back-up buzzer is an added safety measure for pedestrians when you back out of a driveway. You can install one quickly in the trunk of a car equipped with automatic back-up lights, using a door buzzer spliced in the wiring of one of the lights. Mounted and grounded on the metal body, it sounds off every time you back.

Wheel noises on cars having the new large-size hub caps are often caused by the caps themselves. Run a little brake fluid all around the inside crimp, prying gently with a screwdriver to let it all the way in, and you have a lasting cure.



Worn windshield wipers can have their efficiency restored by stropping the edges on sandpaper until clean rubber shows for the entire length. Then you hold the blade on edge and slide it lightly lengthwise on the paper to square it up.

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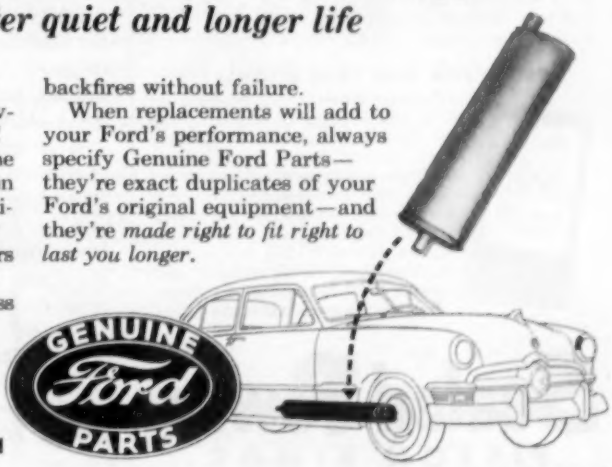
When replacements will add to your Ford's performance, always specify Genuine Ford Parts—they're exact duplicates of your Ford's original equipment—and they're *made right to fit right to last you longer.*



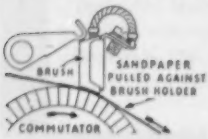
Keep your Ford all Ford

Care and Feeding of Engines

BY S. P CORP

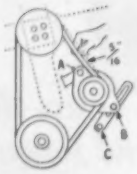
CHECK THE GENERATOR

It is well to check and test your generator every 5000 miles. First see that the fan belt is tight. The generator can't produce its full output with a slipping fan belt. Then make the following inspection: **1.** Remove generator cover and see if there is thrown solder on it. If so, it has been overheated, and should be removed and tested on a test bench. **2.** Inspect commutator. If rough and worn, generator should be reworked. **3.** Lift carbon brushes to see if spring holds them to commutator and they are free to work up and down. Make sure wire connections are tight. Be careful not to loosen connections when lifting brushes. **4.** If brushes and commutator are in good condition but dirty, use carbon tetrachloride to clean them in place. **5.** Now, with engine runnning polish commutator with a strip of 00 sandpaper over a wooden block, held on commutator. To clean brushes, stop engine and use sandpaper under brush as shown. Blow out after sanding. **6.** Oil generator with three drops of oil in cups and replace cover.



INSTALLING FAN BELT

To remove old belt, loosen bolts A, B, and C and move generator toward engine to slip belt off pulleys without forcing; then put on new belt, also without forcing. Adjust tension by moving generator until belt can be moved 5/16" under thumb pressure. Tighten bolt B and recheck tension. Tighten bolts A and B. If belt is too tight it will squeak, and may damage generator front bearing.



WRITE FOR NEW FREE BOOKLET

Send a card now for your free copy of "Care and Feeding of Engines," the new illustrated manual on car care which answers dozens of questions. And when you re-ring, insist on Sealed Power KromeX Ring Sets, with chrome on top compression ring and oil ring side rails. Modern engines demand this protection against heat, friction, abrasion, and corrosion! Sealed Power, Dept. H-3, Muskegon, Michigan.

Sealed Power
PISTON RINGS

Burned-Out Bearings in Your Shoulders

[*Continued from page 132*]

except sudden shock or injury to your shoulder.

If you are in your upper twenties or thirties, begin now to use moderation. Your tendons are still supple (they begin to show wear after 40), but even at this age don't suddenly plunge into heavy work without "tuning up" your muscles with lighter work. If you decide to build a garage or a house, or even to spade up a large garden, make sure your arm and shoulder muscles haven't grown flabby. Be especially careful if you've had an office job for several years.

If you are 40 or over, follow these rules:

1. Get help with any heavy job that will strain your outstretched arms. If you're putting up heavy screens or storm windows, get someone to take part of the load—or let a younger man do the high lifting. Don't be ashamed: It isn't the weight; it's the lifting with stiff, outstretched arms.

2. Avoid sudden repeated jabs. If you mow the grass, don't shove your mower into tight spots and yank it back. Simplify the shape of your garden, and move your shrubs, so your mower can move uniformly forward and you *never* have to pull it back. If you're over 40, a power mower is a great advantage, even on city lawns.

3. Avoid shoveling when you have to lift wet snow and throw it over a pile or drift. A power plow will cost a few dollars, but will spare your arms. If you must shovel, use a small, light shovel.

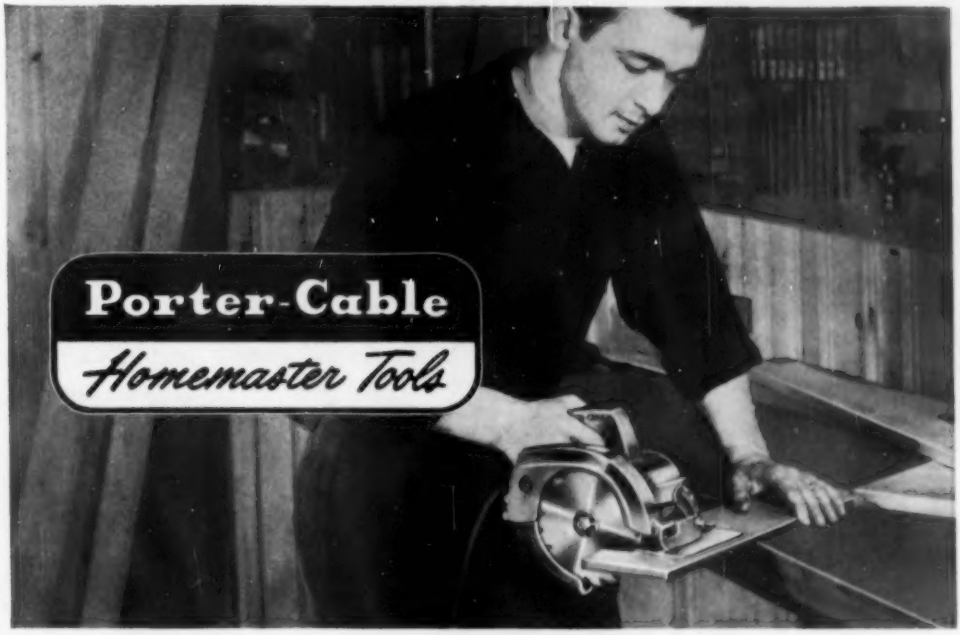
4. In general work around the house:

Hammering: Save for yourself only those hammering jobs that don't require you to (a) lift a hammer repeatedly from the floor (as in nailing down flooring), or (b) swing a hammer above your eye level.

Sawing: Sawing a plank on a low sawhorse puts a load on your shoulder. Clamp the boards in a vise and saw at bench level. Keep a sharp saw! As for sawing boards above your head—let a

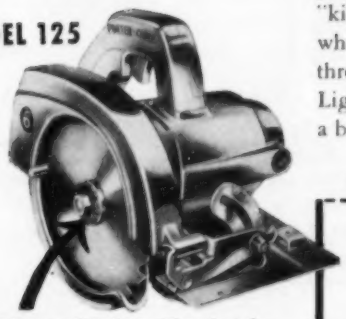
[*Continued on page 256*]

New saw with safety clutch can't stall, can't kick back!



Any job's a *safer* job with this new, low-priced Porter-Cable Saw. Exclusive Kickproof Safety Clutch protects against motor burnout and dangerous "kickback"—telescoping guard exposes teeth only where actually cutting. A Porter-Cable *quality* tool throughout—rugged, smooth-running, built to last. Light, handy—a honey for heft and balance, a bear for work. See it soon!

MODEL 125



Kickproof Safety Clutch, telescoping guard. Instant depth control, built-in angle gauge. Cuts 2" dressed lumber at 90°. Powerful 9-amp. motor, ball-bearing construction, helical gears. Unbeatable buy at only **$49.50**

Visit your Porter-Cable Dealer—or mail coupon today

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5153 N. Salina St., Syracuse 8, N. Y.

(In Canada, send to: Strongridge, Ltd., London, Ont.)

Please send me full information on the Homemaster Model 125 Saw and the name of my nearest dealer.

Name .....

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Finish rooms fast with smooth, strong walls of

SHEETROCK

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PERF-A-TAPE* JOINT SYSTEM
—the secret to smoothness

Special perforated tape applied in combination with PERF-A-TAPE cement assures perfectly smooth joints. Use PERF-A-BEAD* metal corner protection to reinforce outside corner angles. For further information and FREE instruction folder, write Dept. PS 1, Chicago 6, Ill.

UNITED STATES GYPSUM
The Greatest Name in Building

Burned-Out Bearings in Your Shoulders

[*Continued from page 254*]

younger man take on this job for you.

Painting: At or below chest level, painting creates little strain. Above shoulder level, look out! If you use a brush and your arm tires, support your right arm with your left hand. Change to a smaller brush. In painting a house, use a scaffold.

5. In general:

Rest often. Never let your arm tire.

Vary your work. If you've been hammering for 15 minutes, change to sawing, painting or other work for a while.

Use power tools whenever you can, to "unload" your shoulder.

Use wheels. Don't hoist a bag of cement to your shoulder; throw it in a wheelbarrow or cart.

Never lift—or push—a load upward with outstretched arms.

Keep your workshop warm. Dampness, drafts and chills may help cause bursitis.

The treament. For mild chronic shoulder bursitis some authorities say home care, with heat, aspirin and arm exercise are about as good as anything that can be done in a hospital. A doctor's supervision is needed, of course.

Methods of treatment include drugs, X ray, diathermy, ultrasonics, and washing out the bursa with hollow needles.

Care is the answer. Your chances of escaping bursitis are greater if you remember that your shoulders, like a piece of fine machinery, need care.

To help them stay healthy follow these four rules:

- Use them daily (they actually deteriorate if you don't).
- Use them *moderately.*
- At least once or twice a day put them through their full range of motion.
- Don't let your arms overload them.

—Edward D. Fales Jr.

It Isn't Easy

The trouble with planning tourist versions of airplanes is that it's so difficult to make them more uncomfortable than the first-class ones. *—de Havilland Gazette.*

THE GREATEST INVENTION SINCE THE HAND SAW . . .

New AMF DeWalt "Power Shop" brings out the expert in you!

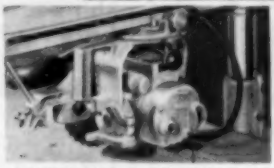
Today, AMF De Walt® "Power Shop" is everywhere known and accepted as the one really safe, accurate, easy-to-use machine. It's so designed that even the inexperienced can *expertly* do everything in home woodworking.

Whether you're modernizing, decorating or repairing your home, AMF De Walt is your best investment. See it demonstrated today. At your De Walt Dealer's or fine hardware and department stores.

$239 delivered (saw blade and custom-built ½ H. P. motor included). EASY TERMS.

All these exclusive extra-value advantages!

TOP-SIDE CUTTING! No guesswork—no mistakes. You always see the cut because layout marks are visible and easy to follow.



PROFESSIONAL ACCURACY! Calibrated scales for miter, bevel and rip are visible above table. Instantaneous settings!

EASY TO USE! You control ball-bearing travel head in radial arm. Moves smoothly, precisely. All cuts perfect—no spoilage.

COMPLETE VERSATILITY! One powerful direct-drive motor accommodates any circular tool—gives full home workshop flexibility.

NO FLOOR SPACE NEEDED! Builds into your workbench! When not in use radial arm swings conveniently out of way, freeing work area.

HOME SAFETY FEATURES! "Stop" red controls, UL*-approved motor, safety key switch, auto-float safety guard (optional).

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☐ Please send me free illustrated booklet "The Greatest Invention Since The Hand Saw" showing how your Power Shop makes me a woodworking expert, saves money in my home.

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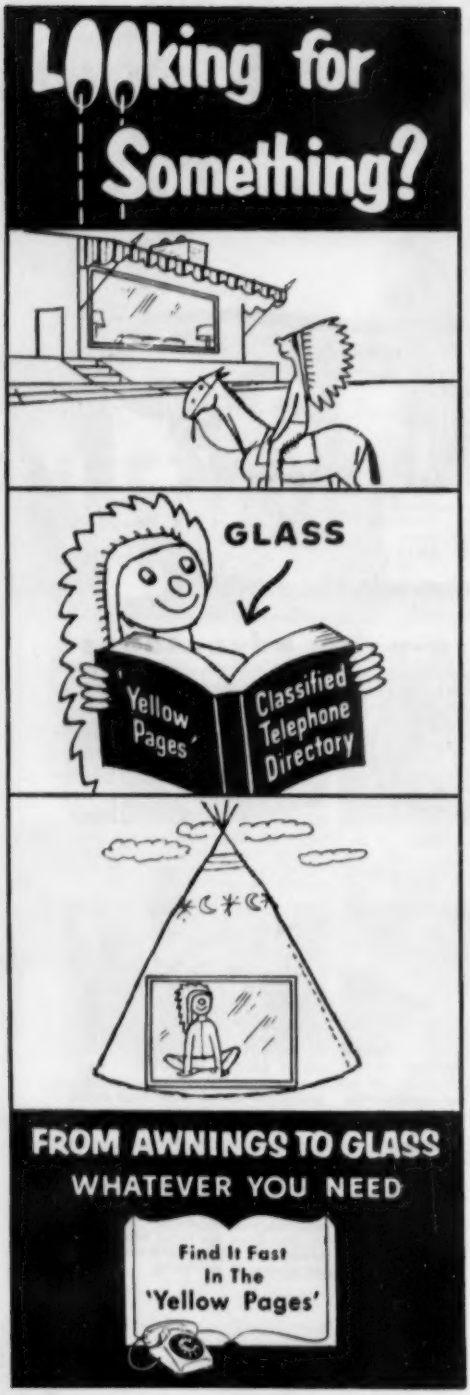

They've Halted Delinquency on Wheels

[*Continued from page 102*]

showing up for "Chuck Pollard Day." The clubs presented Chuck with an $1,100 silver service and a presentation police revolver.

Organizing the unorganized. Only about 10,000 of the state's 52,000 riders are active club members. It's the unorganized majority that the officers seek to reach now. They would like to bring all of them into clubs, or at least group activities like reliability runs. Ehrhardt, faced with complaints about informal back-road racing in the San Joaquin Valley, cooked up a four-town 182-mile reliability run that proved a huge success. It's a big annual event now, and riders with poor records can't get in.

The volunteer patrol is a big part of the picture, as I learned from Johnny Gale, captain of the Ventura patrol. Johnny's a cycle dealer just south of town. He'd heard of the good work the highway patrol was doing—but he was also hearing from riders about the troubles they were having with the Ventura cops. A conference with Chief Taylor pointed to one solution, and Johnny promptly organized a volunteer outfit.

Now a spot on the patrol is coveted by just about every rider in town. There are plenty of guys lined up to replace any regular who leaves. Each man has been graduated from Ventura's police school. He has full police powers, and can make arrests anywhere in the state. When Johnny's boys, resplendent in two-tone uniforms, show up to handle traffic at some public event, they get plenty of respect and obedience.

California's motorcyclists have done more than just launder their reputation. Year before last, accidents involving motorcycles plummeted a spectacular 32 percent compared with '48, and fatalities were down 28 percent. END

Parting Thought

Life doesn't begin at 40 for those who went like 60 when they were 20.—*Texas & Pacific Topics.*

Only the best is good enough

and Shark Brand Chisels ARE TOPS!

Shark Brand Chisels are made of genuine Swedish Charcoal steel hardened, tempered and honed to a razor sharp edge the way only Swedish tool makers can do it!

"Shark Brand" Chisels actually hold their edge longer — much longer than ordinary brands and are designed to make professionals approve and amateurs amazed. See them at your hardware dealer, but be sure to look for the "Shark Brand" trade mark—it's your assurance of perfection—or, if you prefer, write us for new chisel folder and prices. Dept. PS-3

Sandvik Saw & Tool

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DIVISION OF SANDVIK STEEL INC.

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3/4" WIDE Heavy Duty TAPE RULE

LUFKIN White Clad
SUPER MEZURALL

in 10 and 12 foot lengths
Designed to make your measurements faster and easier

LONG WEARING snow white line with bold jet black figures.

RUGGED 3/4" bonderized steel line is flexible, yet extends unsupported.

16" CENTERS clearly marked with diamond.

CONSECUTIVE INCHES marked on this edge.

FEET & INCHES marked on other edge.

FEATHERWEIGHT Magnesium alloy case is lightest (actually 1/3 lighter) yet stronger than other die cast cases.

ADJUSTABLE end hook permits accurate butt-end or hook-over measurements.

FREE "SEE THRU" plastic box with hinged cover and snap fastener with each Super Mezurall.

ALSO AVAILABLE WITH THE FAMOUS CHROME CLAD LINE

All metal line is built up with multiple electroplatings — won't chip, crack or peel. Jet black markings won't wear off and they stand out sharp and clear against the chrome white line.

347

BUY LUFKIN TAPES • RULES • PRECISION TOOLS
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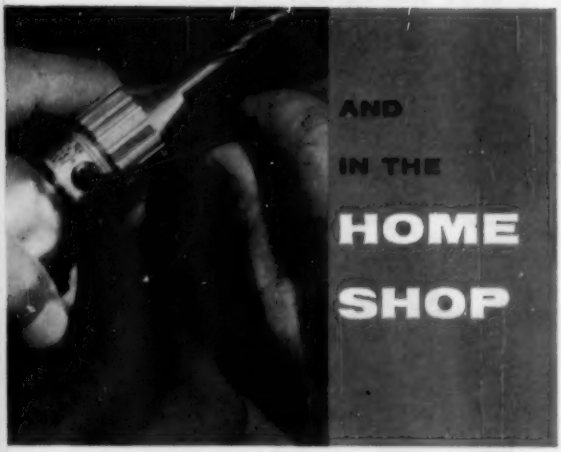
THE LUFKIN RULE CO., Saginaw, Michigan

IN INDUSTRY...

The simplicity, accuracy and gripping power of this Jacobs Rubber-flex collet lathe chuck earned one of the most coveted of engineering awards.



The Rubber-flex collet is also available in the Jacobs Hex-Key chuck for your portable electric drill.

It *looks* different from conventional chucks, because it *is* different. A quarter turn of a standard Allen key gives you tremendous holding power. It actually produces a gripping leverage ratio of 1000 to 1! Another quarter turn easily releases the twist drill. When you see an electric drill equipped with the Jacobs Hex-Key chuck you can be sure the manufacturer has planned well, to give you top value for your portable drill dollar.

Jacobs
RUBBER-FLEX COLLETS

Jacobs
CHUCKS
If it's a Jacobs – it holds

There's Cash in Falling Stardust

[*Continued from page 148*]

one earlier. Almost any camera with a good lens, set up firmly and pointed heavenward, will capture meteorite tracks on fast film. The earth's rotation will convert the star dots into curved lines, but a meteorite's trail will be a straight line angling across the curved star paths.

Just set the lens of your camera at infinity, open the diaphragm wide and leave it about 20 minutes. If you have several cameras, set them all up, aimed in different directions. Be careful to keep dew off the lenses.

The brilliant cloud that usually accompanies a fireball may hang in the air for an hour or two afterward. Scientists are exceedingly eager to obtain good pictures of these clouds for study.

> ***A man's finances rather than his geographical location determine the number of distant relatives that he has.***
>
> —THE SIDEWALK SUPERINTENDENT

The nearer and brighter a meteorite's fiery track appears, the more important a report on it becomes. Most fireballs explode, or at least make roaring or hissing sounds, as they near their destination. If you hear such a noise, your report may be vital to pinpointing the meteorite's landing place. Be sure to notice and write down the length of time you watched the fireball and to fix its direction and its first and final apparent heights, using a building or a tree as a reference point. Give estimates of its color, shape and apparent size, the last by comparing it to the moon or the sun.

Where should you start looking for meteorites? Anywhere you are hiking or traveling. Be especially alert for any chunk of rock that appears to be quite different from the rocks of the surrounding area, particularly if it is partly buried or shows signs of having fallen with great force.

Maybe you'll be lucky enough to hit a five-dollar-a-pound jackpot. END

How you can get perfect paint jobs every time!

Even the best paint won't conceal a surface that's cracked, blistered or scratched. For a professional-looking job you must strip the surface clean . . . and that's what Klean-Strip Paint Remover does, easily and quickly.

Klean-Strip is totally unlike ordinary paint removers that dissolve the finish and are so messy to use. Klean-Strip actually breaks the bond between finish and surface . . . removes many coats with one application. It's clean, fast-acting and easy to use . . . leaves the surface smooth and dry, ready to paint without neutralizing or afterwash.

Use Klean-Strip on furniture, woodwork, walls, metal. It peels off any finish. Buy it when and where you buy paint.

NON-INFLAMMABLE

KLEAN-STRIP

"PEELS OFF PAINT"

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New HOME WORK BENCH

Craf Top® *A sturdy, handsome Work Bench for your home.*

Splinter-proof Resinwood facings. Enameled, heavy steel frame. Rugged . . . Attractive . . . Low, low cost.

In the East and West — HALLOWELL Craf Top®

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If CrafTop Home Work Benches are not yet available in your area, write, giving the name of your dealer, to:
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Rock Island 12, Illinois

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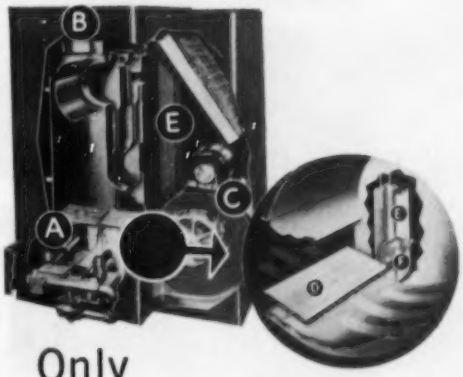
Heating engineers acclaim REGULAIRE* for greatest heating comfort!



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With thermostat set at desired room temperature, burner (A) comes on at Coasting Fire, then turns to High Fire if the rooms are cold. When the furnace bonnet (B) becomes warm, the Regulaire Blower (C) begins quiet delivery of warmth with vane (D) closed. Warm air is drawn down duct (E) and warms thermo-coil (F) which gradually opens vane (D) to gently increase flow of warm air to your rooms. It is this thermo-coil and vane—sensitive to the slightest change in bonnet temperature—plus a Hi-Lo burner that regulates the flow of warmth to your rooms, and assures perfect heating comfort in any weather. Send for free informative book, "If It's Comfort You Want". The Perfection Stove Company, 7638-A Platt Avenue, Cleveland 4, Ohio.

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Perfection
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AND NEW GOLD BOND TWINSULATION Blankets are rugged, easy to install. They give you greater savings on heating—and air conditioning—and add year 'round comfort, too! Send today for the new illustrated Gold Bond "Home Insulation" book below. Shows you how to install the right insulation yourself.

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I enclose 10¢ for "Home Insulation" booklet.

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City..... *Zone*..... *State*.....

Marble-Top Furniture
[*Continued from page 184*]

give it an immediate coat of high-grade white or colorless wax. Rub on a thin, even film, let stand for 10 minutes, then buff to a high gloss with a lamb's-wool applicator or a soft cloth. A buffing wheel in an electric drill can save you a lot of elbow work on this. The wax coating should be washed off with warm water and renewed periodically to prevent further staining and dulling of the marble.

Professionally finished marble should also be waxed to protect its finish. Such marble, however, may have been specially treated to give a high gloss that may dull under heat and be hard to restore. Ask your dealer about this when you buy the marble.

A righteous-living person is one who always calls a spade a spade, even when he trips over one.
—THE SIDEWALK SUPERINTENDENT

Patching a crack. Broken pieces of marble can usually be cemented back together again so long as no great strain is placed on the repair. If your marble has been unsupported, it's wise to add a brace under the crack or set the entire slab in a frame that will hold it together.

The pros use special cements that aren't readily available to the public, but a friendly local dealer may sell you some. If not, you can use stick or flake shellac sold at most paint stores. Heat the two edges of the marble with a small torch or over a hot plate, then heat the shellac until it just starts to melt. Spread the shellac on the edges just short of the top so it won't ooze out, press the pieces tightly together, and hold until cool. Let stand overnight, then sand and polish the crack to restore the luster.

Since the shellac comes in many colors, try to select one that most nearly matches the color of your marble. For a quick patch where strength isn't needed, candle wax mixed with shoe polish or oil colors makes a smooth, lustrous crack filler. END

the "last word" in lawn beauty

The emerald green of a *Scotts Lawn* stands out in any neighborhood . . . folks can spot them as far as the eye can see. Scotts is a skillfully blended combination of 100% perennial grasses—practically weed and chaff free — a value unexcelled . . . you sow 1 lb instead of 3.

Get Scotts at dealers along with other *Scotts Lawn Care Aides* — time saving spreaders, weed and pest controls and TURF BUILDER®, the quick acting, long lasting grass food which feeds lawns to new health and beauty. Clean, granular, has no offensive odor — costs less than a dime per 100 square feet.

For your lawn's sake, insist upon Scotts.

Ask for a Free 2-year subscription to LAWN CARE®. It tells how to keep your lawn sparkling green all summer long—simply drop a card to

O M Scott & SONS CO, 18 Spring St, Marysville, Ohio

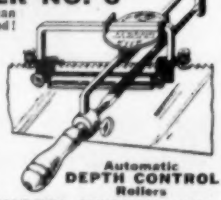
FILE SAWS THE RIGHT WAY

SUPER SAW FILER NO. 6

IT'S NEW! and so simple you can file a saw blindfolded!

Automatically controls
DEPTH—ANGLE—PITCH

Perfect bevel and angle maintained, and fool-proof depth control for all Rip, Crosscut, and Handsaws. Precision made and calibrated for instant setting at desired angle. Can be used in any vice or clamp. Complete with file, only **$6.50** ppd.



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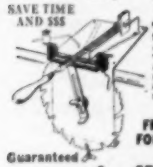
SAVE TIME AND $$$



JOINT & SHARPEN CIRCULAR SAWS

Sensational new Super Filer No. 11 joints and sharpens both **hand** and **circular** saws 6" to 10" with all teeth the correct height, depth, pitch and bevel. Easy to use—when file hits hardened steel roller, teeth are finished. Saw runs true and smooth with no side pull. Complete with special 8" file **$9.95 ppd.**

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saves you time and money

This low-cost tile withstands the rough treatment youngsters give it — lasts for years. Made in 24 beautiful colors, it can be installed on, above or below grade. You can install it yourself — precision-cut edges and true corners make the job simple, especially when you use the B. F. Goodrich Self-Installation Kit.

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B. F. Goodrich Co., *Dept. PS3, Flooring Division, Watertown 72, Mass.*

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Here Come the "Sports-Car" Boats

[*Continued from page 163*]

winding her up, keeping an eye on the tachometer.

At 800 r.p.m. we were running level. By 950 r.p.m. our tail was dipping. The dual exhausts went under with a chesty gurgle, and the rear deck was right down at the water. Soon we were opening up quite a trough in the St. Clair, and the exhausts roared out again, throwing steam into our frothing wake.

The bow rode high now. I couldn't see a thing forward. We were slamming water so hard our spines and heads bobbled; our feet danced on the cockpit decking. How could anyone see debris ahead from this angle, much less tell the difference between a log and a wave?

At about 1,200 revolutions we hit a sharp planing angle and held it. The breaking point came when the white tach needle hit 1,750 r.p.m. One minute we were pounding the waves, then dancing, the next minute, skimming.

We leveled off again, the way we had started, but this time we were riding the top of the water. We had reached the far end of the Cobra's planing cycle.

As the big V-8 behind us hit 3,000 r.p.m. we flattened out about as much as we were going to. The foredeck was level to the water now, giving us a full sweep of the waterscape. By 4,000 the waves were only a blur to the eye and nothing to the seat of the pants.

Rudder Noses Her Down

Slacking off to about 2,800 r.p.m., I tried a little maneuvering. The Cobra leans over in high-speed turns, and like any other boat it will make a depressive elevator out of its canted rudder if you tilt too far. From then on, as the rudder throws your front end down to the depths in an outside loop, it's women and children first.

I found this out, although fortunately only jostling us around the four-place cockpit a little.

With fast tiller recovery, the Cobra

[*Continued on page 266*]

NEW 12-FT. POCKET TAPE
MAKES L-O-N-G MEASUREMENTS EASY

made only by **EVANS**

Only $1.89

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Work in inches? Read here ▶

King-Size 10-Ft. White-Tape

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For Upright Measurements!

Wider (3/4") heavy-duty blade makes those long upright measurements easy and accurate. Exclusive EVANS double markings, same as 12-ft. pocket tape. FREE belt clip and Tenite utility case with every EVANS King-Size.

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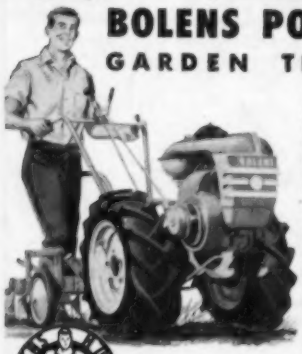

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Keeps oil clean from filter change to filter change when replaced as normally recommended.

Here Come the "Sports-Car" Boats

[Continued from page 264]

will turn on itself very nicely, albeit scooping a little water over the gunwales once in a while. The 18-footer is especially handy for darting and swooping, and one company test driver has thrown the boat's rudder hard over at full throttle.

But this isn't recommended for the ordinary guy.

Back on land again, A. W. MacKerer, company production superintendent, explained that the Cobra got its hull design from 30 years of Chris-Craft boating evolution and its fuselage styling from the example of such Gold Cup racers as the Slo-mo-shun IV and V.

The boat's slim hull with a sheer-to-waterline measure (freeboard) tapering from 26" at the bow to 11" at the transom has been taking shape, as part of a development program since the mid-1920's, MacKerer said.

Ancestor of the Cobra is a six-place 21-footer launched last year. In cross-section it has a similar broad, upper hull stepped in sharply to a candle-slim keel. Nevertheless when pilots first flumed the Cobra out of Chris-Craft's slip and onto the river they didn't quite know what was coming, because a few pretty radical changes had been made. Eventually they found that long planning paid off in both speed and stability.

Says MacKerer: "Our boats must be both fast and safe. We could probably get faster performance if we disregarded the safety factor."

Not much has been disregarded in this gold-finned sportster, be it for pleasure boating or modification as a racer. The Cobra should be a slick boat in anybody's log. END

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Bob: "Yeah, I know, but I intend to wear a muffler with it."—*Wireco Life.*

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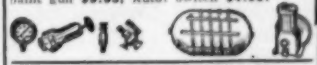

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How Some Painters Rook Homeowners

[*Continued from page 137*]

to wear down so that the old film wears off.

- When sold by unscrupulous contractors, these mastic jobs usually are not cheap. Even if they performed exactly as the contractors promised, they usually would still be more expensive than paint.

For example, a homeowner in Brooklyn paid $1,200 for a coating that stained within three months. A reputable local contractor estimated that the house could have been painted three times for that sum.

- Quick-dollar promoters often claim that their product has high insulating value and complete immunity to weather, fire, decay and termites. Any paint has some insulating properties—but the "complete immunity to weather" claimed is nonsense.
- Talk of 10- and 20-year guarantees for any paint job should also be a red light to homeowners. No reliable paint company will unconditionally guarantee its work, because so many variables can affect its durability.
- Any product that claims to prevent cracking and peeling should be eyed with suspicion.

"Water may come from inside the house as condensation during cold weather," reports F. L. Browne, chemist of the Forest Products Laboratory of the U.S. Department of Agriculture, "or from outside when storm water penetrates. Merely covering the outside with a thick plastic coating that retards drying out of the side walls even more than ordinary paint does, may well serve to hasten permanent damage."

- No responsible authority knows of any "miracle coating" that will perform as the unethical mastic paint operators claim their product will. END

No Special Place

"This is daddy's den," a little girl told her playmate. "Does your daddy have a den?"

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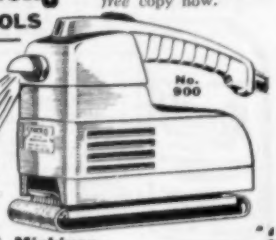

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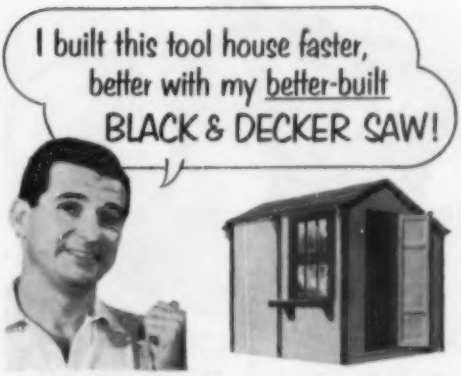

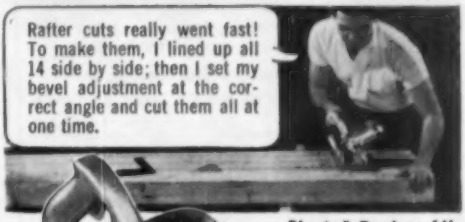

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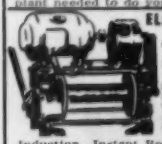

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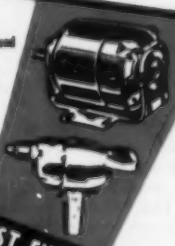

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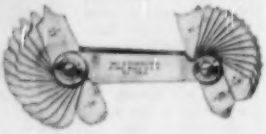
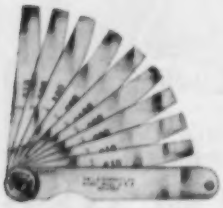
Size A, 30 leaves, 1/32 to 1/4" radii. Size B, 32 leaves from 1/64 to 1/2".





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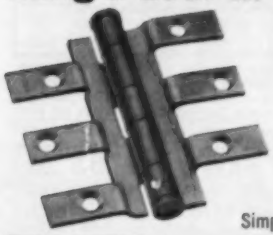

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you put up from inside in seconds

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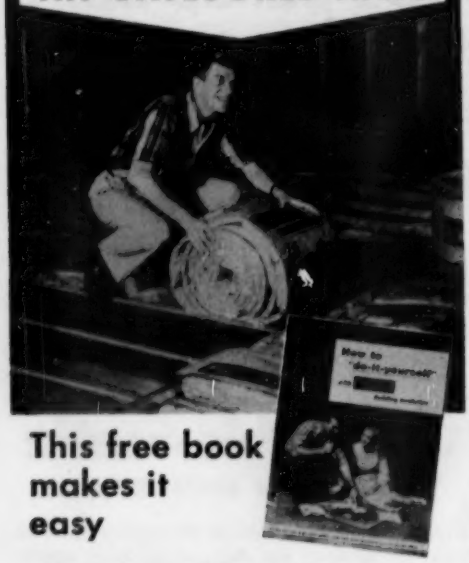

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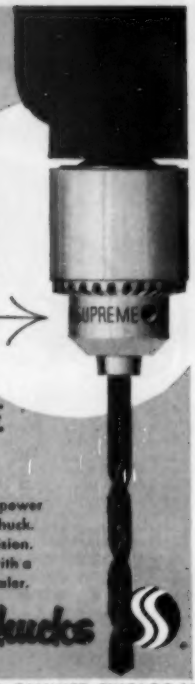

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USE FOR: ● Reamer Drives ● Midget Cars ● Feed Mills ● Canning Machines ● Conveyors ● Lathes ● Milling Machines ● Motor Boats ● Cream Separators ● Garden Tractors ● Pumps. Variable output speeds from 0 to input speed available by moving control handle. Locking handle maintains setting. Use input power of ¼ to 1½ H.P. Shafts ⅝" diam. Input rotation counter-clockwise facing shaft. Input speed 750 R.P.M. 7½"x7½"x11½". Gov't acquisition cost $428.50. Shpg. wt. 31 lbs. Complete with 2 qts. of oil and full instructions. F.O.B. Chicago **54.50**

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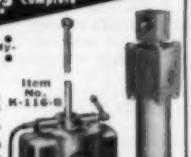

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Welds Anything From Auto Fenders To Tractor Frames

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- **3½" BORE—8" STROKE**
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IDEAL FOR USE WITH
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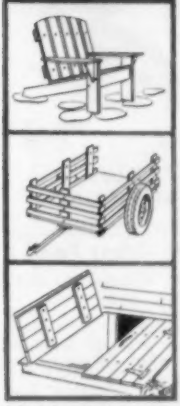

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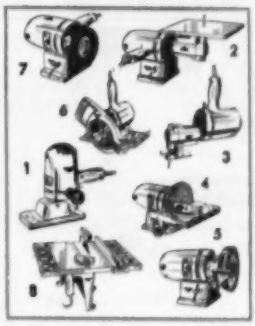

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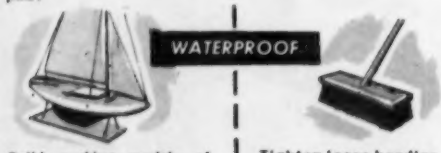

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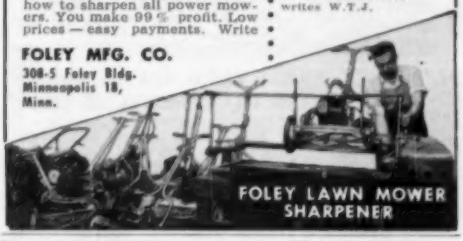

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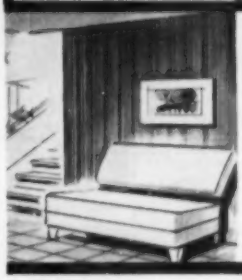

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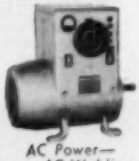

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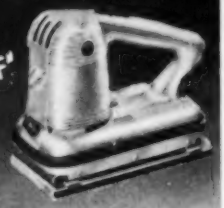

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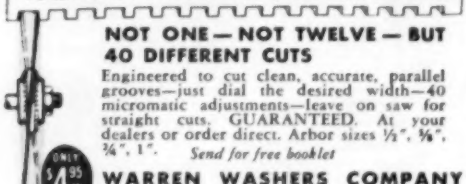

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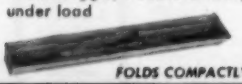

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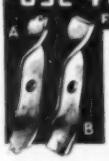

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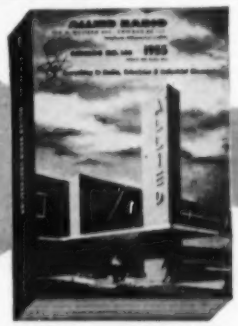

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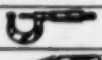

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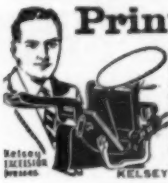

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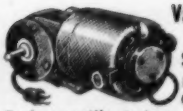

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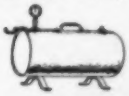

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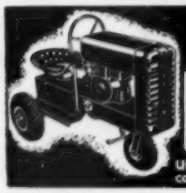

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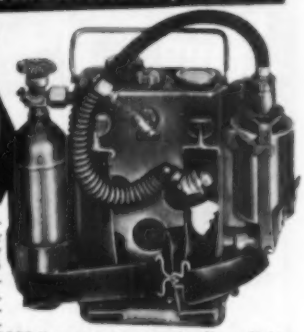

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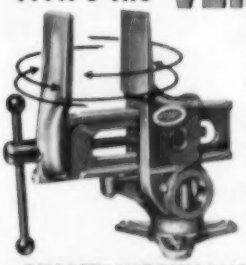

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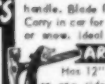

Has 12" steel head with Mattock on one side pick on the other. 16½" hardwood handle. Belt case. **1.29**

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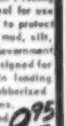
NAVY WADERS



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[Continued from page 125]

that its local talent will have new wonders every year that the Chamber of Commerce has leased a lot at the Nebraska State Fair for an annual Columbus show. The sensation for 1954 was an improved hay loader developed by Marvin Preifert and a research group headed by Dr. Frank G. Johnson, who works on such things between calls on patients.

On a modern farm, machines bale the hay in the field. The bales, left in rows on the ground, are heavy and awkward to handle, so loaders of the escalator belt type are used widely. Some of these have a serious fault: they won't pick up the bales without human assistance. Also, round bales, now replacing square bales, roll off the escalator.

Preifert, whose prairie farm is 30 miles from Columbus, is a keen observer. Watching clods caught on the tread of his tractor wheel go around with it, usually dropping off near the top, he got an idea. He saw those clods as bales of hay. Using old materials he picked up here and there, he built a wheel loader to fit his vision, calling in Dr. Johnson's research staff for technical help.

At their 1954 fair Nebraska farmers saw a loader that resembled a small Ferris wheel. It was mounted on a wheeled frame that could be easily pulled by a farm truck. Instead of seats for riders, this Ferris wheel had sets of steel prongs regularly spaced along its rim. As the wheel is drawn forward, the prongs slip under, and raise, any bulky object lying in the wheel's pathway.

When hitched beside a farm truck, on the driver's side but nearer the rear, the wheel, canted at a 45-degree angle, overhangs the truck's loading space. Bales picked up by the revolving fingers slip off naturally at the top of the turn, and drop into the truck's body.

According to Dr. Johnson, tests have indicated that this novel bale loader works in any sort of farm field, handles round bales as easily as square, and enables its two men and truck to do the work done by six men and truck using older methods. So another new factory will soon be scheduled for the Industrial Site.

That area, corn field 10 years ago, is now almost filled with busy industries. A second vacant tract, the property of the town of Columbus, has already been marked on the municipal plan as Industrial Site No. 2. At the Chamber of Commerce, Manager Doane Fessenden will tell you with no little pride that America has discovered Columbus. Actually, Columbus discovered itself first. END

NEXT MONTH . . . **Suburban Home Ideas**

So you're one of the growing band of American adventurers who are planning to buy or build in the suburbs? Or maybe you already have the house and now are bent on fixing it up into just the kind of home you and your family have been dreaming of. Either way, you'll be smart to watch for the April issue of POPULAR SCIENCE MONTHLY. It will carry two special groups of features packed with new-house ideas and home-improvement projects, angled for the man who wants to save by doing some of the work himself.

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(Item 31) Wt. 210 lb.
Reg. price $585. Special at..... **$299.50**
Same plant with electric self starter (Item 31a) **$359.50**
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DUAL VOLTAGE 110-220 available on any of above models for $28.00 additional.

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Tractor shown with Rotary Tiller Attachment

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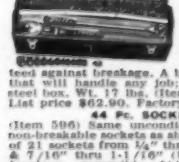
Snow Blow.... $39.50 Dump wheel barrow 49.50
Rotary Lawn Mower 39.50
Sickle Bar Mower..... 49.50
Lawn Mower Hitch..... 4.75
Easy payment plan available. Freight paid east of Rockies—half paid elsewhere.

JET STEAM MASTER

Now, a super efficient portable steam generator that produces live steam at 100 lbs. pressure in 60 seconds from a cold start! Produces large volume of high pressure steam on 2 pints of fuel oil. Instantly cleans sticky grease, dirt, rust, old paint, etc. off implements and road machinery. Pays for itself in a few weeks. Sterilizes soil. Sterilizes as it cleans—milk equipment, etc.
Fully automatic—oil fired with new, built-in lifetime bronze water circulating pump. Draws water from faucet or bucket. Simple and safe—anyone can use it; built-in safety valve. Complete with 12 ft. of hi-pressure steam hose and new triple efficiency steam gun that automatically mixes in soap solution if desired. Wt. 250 lbs. Item 463.
Special factory price..... **$329.50**

52 pc. SOCKET SET



Highest quality, guaranteed non-breakable sockets made by Husky. Beautifully matched chrome thin wall alloy absolutely the best. Contains a complete set of 28 sockets in ½" drive, ⅜" drive and ¼" drive, plus all necessary extensions, handles, speeders, reversible ratchets, etc.; all uncond. guaranteed against breakage. A beautiful set of tools that will handle any job; in a big doghouse steel box. Wt. 17 lbs. (Item 205)
List price $62.90. Factory special.. **$27.95**

44 Pc. SOCKET SET
(Item 596) Same unconditionally guaranteed, non-breakable sockets as above. Complete range of 21 sockets from ¼" thru 7/16" (¼" drive) & 7/16" thru 1-1/16" (½" drive). Two extensions, reversible ½" ratchet, 3 drift punches, sliding "T" head, all angle coupling, ½" speeder, ¼" breakover, 5 pc. high chrome alloy combination wrench set and 8 pc. offset wrench set in big doghouse tool box with ample room for other tools.
Reg. $49.50. Wt. 16 lb..... **$21.95**

(Item 24)

600-700 WATTS PUSH BUTTON START
115 v. 60 cyc. AC Powered by a rugged 2 HP easy starting Briggs engine. No wiring necessary; just plug in and operate. Plenty of current for any oil burner, freezer, brooder, emergency lights, etc. which require up to 700 watts. Ideal for television and radios. Complete with Voltmeter and built-in winding to charge 6 v. auto batteries. (Item 24.) Wt. 75 lbs. Easily fits in car trunk. Be prepared if storm knocks out power lines. Reg. $275 value.... **$143.50**
1000-1200 Watt Plant (Item 45) same as Item 24 but larger generator and engine with 50% greater output..... **$199.50**
LITTLE GIANT—380 WATT (Item 273) 115 v. DC 1½ hp. Briggs engine. Perfect for lights, radios, chain saws and power tools. Wt. 65 lbs..... **$99.75**

PORTO-POWER 1500-1750 Watt Plant
115/120 v. 60 cyc. AC. Push button start. Powered by a 4.5 HP Briggs engine. Combines compactness and easy portability with higher output for handling heavier starting loads. Ideal for operating oil burners, sump pumps, freezers, television, lights, communication systems, etc. Perfect for contractor's power tools. (Item 26). Wt. 146 lbs.
Factory Special Price **$279.50**

(Item 26)

MASTER-LITE 2500 Watt Plant
110/120 v. 60 cyc. AC. A powerful plant, rugedly constructed and yet designed for easy portability. Can be started by rope or built-in 12 v. electric push button starter. Built-in winding to charge battery. Powered by a big 5.10 HP Briggs engine, complete with all accessories. Includes control box, voltmeter, and handy plug-in power receptacle. An ideal plant for permanent or stand-by service. Wt. 275 lb. Reg. price $645.00
(Item 21) Factory Price **$329.50**

(Item 21)

Dual Voltage 110/220 available for above plant for $30.00 additional.
3500 Watt Plant Push Button Start (Item 23) 115 v. 60 cyc. AC. Similar to above, but larger and 33% more capacity. Wt. 270 lbs. Reg. $760. Factory Price **$379.50**
3500 Watt Dual Voltage Model—Similar in design to Item 21 above, but with 110/220 3 wire output. Affords choice of either 110 or 220 volts. (Item 23 d.v.)..... **$409.50**
We make fully automatic controls to operate any of the above light plants. Write for details. **We make all sizes up to 25,000 Watts.**

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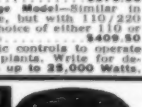

Heavy duty and very flexible. Neoprene 14-2 cable. 20 year quality. Wt. 12 lbs. (Item 185) 100 ft. Complete with rubber plug and outlet. A terrific buy at only **$8.95**
NO. 12-2 POWER CABLE. Very flexible rubber covered, special outside shield for grounding power tools, etc. 50 ft. (Item 199) wt. 8 lbs. $6.95. 100 ft. (Item 200)..... $12.95

MASTER AIR COMPRESSOR

Tank Tested up to 500 lbs. per sq. in.

COMPARE! This is the only compressor built with a NO RUST stainless steel tank. Safe up to 500 lbs.
(Item 209a) High pressure type (4 c.f.m.) Large volume of air for heavy duty service. For paint spraying, inflating truck & auto tires, greasing, sand blasting, etc. Piston type 2" bore compressor with built-in air filter. Master built with high strength alloys and precision bearings. Tank, 12"x24", 2100 cu. in. cap. Equipped with automatic switch that starts and stops motor to maintain desired pressure (up to 150 lbs.) and check valve, safety valve, gauge, shut-off valve, 20 ft. air hose and tire chuck. Beautifully balanced on ball bearing wheels and rubber tires. Don't take chances with used or surplus equipment. Our compressors are factory new and are guaranteed SAFE. Low factory prices. 1½ HP Model (cap. 85 lbs.) **$109.50**
Reg. $175. (Item 209p)..... **$129.50**
½ HP Model-heavy duty R.I. motor with unloader switch. (Cap. 150 lbs.) (Item 209a)..... **$129.50**

LESS THAN WHOLESALE

DIESEL LIGHT PLANT
(Item 1660) Diesel Master—11-12 kw. 110/220 v. AC single or 3 phase, 1800 rpm direct connected. Electric Self-starting. Engineered for permanent power where continuous low-cost, heavy duty service is important. Wt. 1350 lb. Reg. list $3650.00. Factory price... **$1895.00**

(Item 1660)

GAS DRIVEN PLANT. 10-11 kw. 115-230 v. 60 cyc. AC, single or 3 phase, powered by 4 cylinder Wisconsin air cooled engine. Belt driven. Simple, reliable. A V-belt drive mounted on rugged steel skid. (Item 217) (with crank start) **$1075.00**
Wt. 900 lb. Factory price..... **$1145.00**
Same plant with self-starter.....

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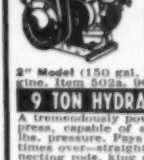
Save big money installing your own barn ventilating fan. Efficient propellor type blade moves huge volume of air quietly and effortlessly. Heavy welded frame — pre-drilled for easy installation. Just cut opening and bolt in place. Continuous duty motors. Ideal for keeping barns and chicken houses dry and ventilated. Control manually or with thermostat.

Blade Opening	CFM	Wt.	Item	
16"	1814"	2025	19 lb.	365a	$27.95
18"	19¼"	3600	27 lb.	365b	$31.95
20"	21¼"	4100	30 lb.	365c	$39.95

THERMOSTATS: BARN type (range 40°-60°). Wt. 2 lbs. $6.95.

HI-FLO Centrifugal PUMP

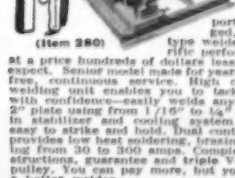


Completely self-priming! No foot valve required. Tremendous capacity—100 gal. per min. ! . . Special impeller enables pump to handle muddy or sandy water. Simple to operate—simply start engine and watch the water go. Powered by a rugged, easy-starting 2 HP Briggs engine. Prelubricated sealed bearings for years of heavy low-cost service.
Big 1½" Model. Item 505. Wt. 70 lbs.
Factory price... **$134.50**
2" Model (150 gal. per min.) with 2½ HP engine. Item 502a. 102 lbs. Factory spec. **$154.50**

9 TON HYDRAULIC PRESS

A tremendously powerful hydraulic press, capable of exerting 18,000 lbs. pressure. Pays for itself many times over—straightening bent connecting rods, king pins, crankshafts, axles, bolt pins and bars — or pushing out frozen bearings and bushings. Developed pressure under precise control and visible at all times on accurate gauge. Complete with both large and small anvils and jigs to straighten any kind of curve or bend. (Item 464) Wt. 110 lb. Actual list price $365. Our special introductory close-out price.... **$69.50**

MASTER DC ARC WELDERS



(Item 280)

Now! a portable, rugged, industrial type welder with terrific performance, yet at a price hundreds of dollars less than you'd expect. Senior model made for years of trouble-free, continuous service. High capacity DC welding unit enables you to tackle any job with confidence—easily welds anything up to 3/8" plate using from 1/16" to 1/8" rods. Built-in stabilizer and cooling system makes arc easy to strike and hold. Dual control rheostat provides low heat soldering, brazing and welding from 30 to 300 amps. Complete with instructions, guarantee and triple V-belt or flat pulley. You can pay more, but you can't buy a better welder.
WELDER ONLY—DUAL CONTROL MODEL. Same as above, but drive with your tractor, jeep or gas engine of 14 HP or more. (Item 28a.) Wt. 110 lbs. $400 value..... **$119.50**
WELDER ONLY—STANDARD MODEL. Same as above but with single rheostat for heavy metal welding only. (Item 28b.) Wt. 110 lbs. $400 value. Special.. **$99.75**
COMPLETE POWER MASTER (Illustrated above) powered by a 14.5 hp. air cooled Wisconsin engine. Wt. 480 lbs. (Item 280) Compares with welder costing $1200. Factory Special..... **$449.50**

WELDING KIT Two 10 ft. leads, welding helmet, electrode holder, ground clamp. Sold only with welder at... **$10.50**

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Building Better Tools Since 1906

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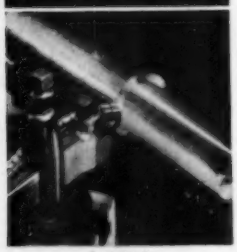
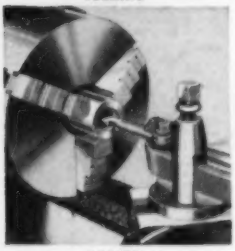
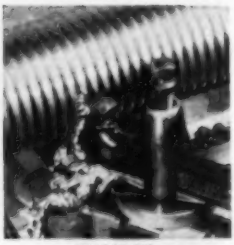
A Few of the Many Operations You Can Perform



TURNING

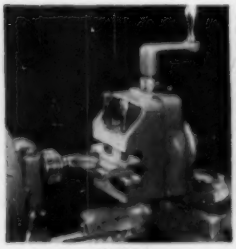


BORING

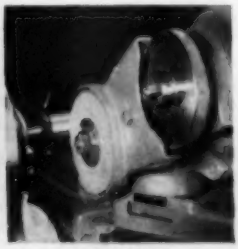


THREADING

FACING



MILLING



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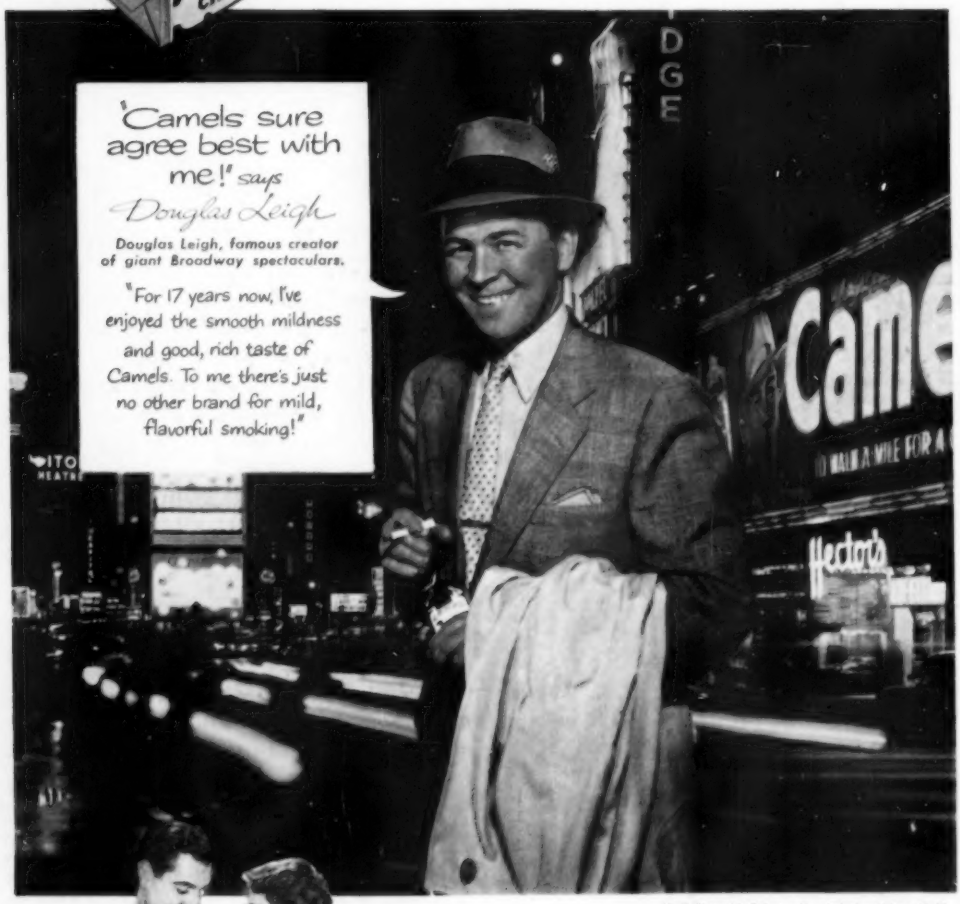

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